

adult. This fact, hitherto apparently unmentioned, naturally caused my brother and myself some embarrassment in naming these young birds: but at last we separately came to the conclusion that they were examples of this insular species; and our opinion has been fortified by the opinion of two such good authorities as Mr. Salvin and Mr. Ridgway, who have seen the specimens and given their judgment independently.”

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Prof. Garrod, F.R.S., read a paper on the brain and other parts of the Hippopotamus (*Hippopotamus amphibius*).

The author having had the opportunity of studying the brain of the adult male Hippopotamus presented to the Society by the late Viceroy of Egypt on May 25th, 1850, which died (apparently of old age) on March 11th, 1878, described it at some length, other accounts, by Gratiolet and Macalister, having been based upon the dissection of new-born individuals.

Basing his description upon the nomenclature adopted by Dr. Ureng in an important recent memoir on the brain in the Ungulata<sup>1</sup>, it was shown by the author that in the comparatively simple brain of the Hippopotamus, besides the great number of bridging convolutions laid so much stress on by Gratiolet, the middle gyrus of the outer surface of the cerebral hemisphere was peculiarly broad and bent by minor folds, at the same time that the fissura lateralis was continuous with the more anteriorly situated coronal fissure. The considerable differences between the brains of *Hippopotamus* and *Sus* were pointed out, as well as the characterizing features of the former.

The enormous stomach of the adult was stated to be 11 feet in length, at the same time that its position was different from that of most animals, its long axis corresponding with that of the body.

The particularly simple and transversely elongated liver, with its lengthy gall-bladder, was also described in detail.

This paper will be published entire in the Society's 'Transactions.'

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The following papers were read:—

1. On the Mollusca procured during the 'Lightning' and 'Porcupine' Expeditions, 1868-70. (Part II.<sup>2</sup>) By J. GWYN JEFFREYS, LL.D., F.R.S., F.Z.S.

[Received June 5, 1879.]

(Plates XLV., XLVI.)

*Preliminary remarks.*

References will be given not only to the original authority for each species, but also to a figure in some recognized publication, in default

<sup>1</sup> Zeitsch. für wissenschaftl. Zoologie, Leipzig, 1878, pp. 297-344.

<sup>2</sup> For Part I. see P. Z. S. 1878, p. 393.

of which the plates which accompany this paper will supply the necessary illustrations. I consider it useless to add every synonym, a kind of work that serves no other purpose than to display the industry of the writer. For the same reason the authority for any locality mentioned in this paper is omitted, although I am prepared to name it. The position of each station, and the corresponding depth will be found in the introduction to the first part.

I prefer describing new species in my own language, instead of in dog-latin; and of course my continental friends are entitled to a similar privilege. The time has long passed since a knowledge of any of the principal languages of Europe was confined to its own country, when it was thought desirable to substitute Latin in scientific treatises. It should also be borne in mind that English is much more generally spoken and used than any other language in the civilized world. Latin cannot be applied with sufficient precision and intelligibility to the description of Natural-History specimens. For instance, we know next to nothing of the colours designated by classical names; yet conchologists do not hesitate to use such barbarous words as "griseus," "ochroleucus," "spadiceus," "aurantius," and "olivaceus," which appear in the works of Philippi and other authors of repute, but not in any good Latin dictionary.

The present work will form an additional supplement to 'British Conchology,' so far as regards our native Mollusca.

## CONCHIFERA.

### Family I. ANOMIIDÆ.

#### ✓ 1. ANOMIA EPHIPPIMUM, Linné.

*Anomia ephippium*, L. Syst. Nat. ed. xii. p. 1150: British Conchology, ii. p. 30, pl. i. f. 4; v. p. 165, pl. xx. f. 1.

'Lightning' Expedition: Stations 2, 3, 4, 5.

'Porcupine' Exp. 1869: St. 1, 3, 13, 14, 18, Loch Foyle, 39, 47, 70. 1870: Atlantic, 1, 2, 3, 6, 8, 9, 10, 12, Vigo Bay, 16, 17, 17a, 24, 26, 27, 28, 28a, 29, 30, 36; Mediterranean, 45, Capo de Gata, 50, Gulf of Bona, G. Tunis, Adventure Bank. Various shaped and sculptured. A specimen of the variety *aculeata* is partly smooth, and in that respect exactly like the young form or *squamula*; the variety *cylindrica* in Stations 1 of 1869 and 1870 was attached to the spines of *Cidaris papillata*. In some of the specimens the byssal orifice is unusually small.

*Distribution.* Type and varieties. Iceland to Egypt and Madeira, Labrador to Long Island Sound, 'Challenger' Exp. (coast of Brazil), Corea. Depths, low water to 1450 fathoms.

*Fossil.* Pliocene and Post-tertiary. Scandinavia, Great Britain and Ireland, Belgium, Vienna Basin, South of France, Italy, Morea, Rhodes, Nantucket I. Heights 0-460 feet.

Professor Verrill has lately separated the North-American form from ours under the specific name *glabra*; but I cannot detect any characteristic difference between them. This makes the 36th

synonym. The opinion that this mollusk is of a poisonous nature when eaten (B. C. ii. p. 32) has been confirmed by Dr. Hidalgo, who says that at Mahon it is called "ostia borda de veri" for that reason.

2. ANOMIA PATELLIFORMIS, Linné.

*Anomia patelliformis*, L. S. N. p. 1151 : B. C. ii. p. 34 ; v. p. 165, pl. xx. f. 2.

'Lightning' Exp. : off the Faroe I.

'Porcupine' Exp. 1869 : St. 2, 9, Galway B., 23a, The Minch. A specimen is marked like *Amussium hoskynsi* in an imbricated fashion. 1870 : Atl. 29, Tangier B. ; Med., Cartagena B.

*Distribution*. Faroe I. to Mediterranean and Adriatic, N. W. America ; 0-420 fms.

*Fossil*. Pliocene and Post-tertiary. Scandinavia, Great Britain and Ireland, Belgium, Vienna Basin, and Italy ; 4-130 ft.

Seventeen synonyms, including *Ostreum striatum* of Da Costa, and *A. striata* of Brocchi and Lovén.

Family II. OSTREIDÆ.

1. OSTREA EBULIS, Linné.

*Ostrea edulis*, L. S. N. p. 1148 : B. C. ii. p. 38, pl. i. f. 5 ; v. p. 165, pl. xxi. f. 1.

'Porcupine' Exp. 1869 : St. 6, 9, Galway B. Valves of young shells, one being deeply concave, and resembling *O. cochlear*. 1870 : Atl. Cadiz ; Var. *parasitica*, Med., Capo de Gata and Cartagena B.

*Distribution*. Iceland to Mogador, Mediterranean and Adriatic, Sea of Azof, Nova Scotia and Newfoundland ; 0-45 fms.

*Fossil*. Pliocene and Post-tertiary. Scandinavia, Great Britain and Ireland, Holland, Belgium, Germany, Vienna Basin, S. France, Italy, Algeria, Turkey in Europe ; 0-1360 ft.

The synonyms are numerous, owing to the extreme variability of the shell.

2. OSTREA COCHLEAR, Poli.

*O. cochlear*, Poli, Test. utr. Sic. ii. p. 179, t. xxviii. f. 28.

'Porcupine' Exp. 1869 : St. 1, 35. 1870 : Atl. 10, 13, Setubal B., off Cape Sagres, 26, 36 ; Med. Cartagena B., 50, 50a, off Jijeli, 55, G. Bona, Benzert Road, Rasel Amoush, G. Tunis, and Adventure Bank. Some small and young specimens are intermediate between this species and *O. edulis* ; and I am by no means satisfied that the two are distinct. *O. cochlear* inhabits deeper and more still waters than *O. edulis* ; and it is attached to corals, shells, and other organisms, being often clustered together.

*Distribution*. Atlantic coasts of France and Lusitania, the Mediterranean, Adriatic, Ægean, and Canaries ; 40-205 fms. The depth at which it was affixed to the Cagliari-Bona submarine cable, and noticed by Professor Alphonse Milne-Edwards, is doubtful.

*Fossil*. Pliocene. Coralline Crag (as *O. spectrum*), Belgium, Vienna Basin, Biot, Italy, Algeria, and Morea.

## Family III. SPONDYLIDÆ.

✓ SPONDYLUS GUSSONI, O. G. Costa.

*S. gussonii*, O. G. Costa, Cat. Sist. p. xlii: Philippi, Moll. Sic. i. p. 87, t. v. f. 16.

‘Porcupine’ Exp. 1870: Atl. St. 16, 24, 25; Med. 45, Capo de Gata, 58.

*Distribution.* Mediterranean, Adriatic, and Ægean; 40–120 fms.

*Fossil.* Pliocene. Metz, Biot, Sicily.

*S. gæderopus* did not occur; and it will be seen that many other equally common shells were not procured during any of these Expeditions.

## Family IV. PECTINIDÆ.

✓ 1. PECTEN PUSIO, Linné.

*Ostrea pusio*, L. S. N. 1146.

*P. pusio*, B. C. ii. p. 51; v. p. 166, pl. xxii. f. 1.

‘Lightning’ Exp.: St. 4.

‘Porcupine’ Exp. 1869: 2. 1870: Atl. Vigo B., 36 (*Hinnites* form), Tangier B.; Med. Capo de Gata, 55.

*Distribution.* Faroe Isles to Morocco and the Mediterranean, Adriatic, Ægean, Madeira, Canaries, Azores, and S. Africa; 0–180 fms.

*Fossil.* Pliocene and Post-tertiary. Scandinavia, Great Britain and Ireland, Belgium, Transylvania, S. France, Algiers, Italy, and Rhodes; 0–130 ft.

Several synonyms, including *P. distortus* of Da Costa and *P. multistriatus* of Poli.

I have here endeavoured, as on former occasions, to arrange the species in their natural sequence, so as to show their relative affinity.

In the ‘Porcupine’ Expedition of 1870, I dredged at Station 9 (509 fms.) a fragment of a *Pecten*, apparently allied to *P. pusio*, but representing a shell about an inch and a half in length, and at Station 16 (994 fms.) a very small valve of the same species. It has numerous ribs, which are alternately larger and smaller, and covered with numerous close-set prickles or imbricated scales. I would provisionally name this species *senticosus*.

2. PECTEN VARIUS, Linné.

✓ *Ostrea varia*, L. S. N. p. 1146.

*P. varius*, B. C. ii. p. 53; v. p. 166, pl. xxii. f. 2.

‘Porcupine’ Exp. 1869: Loch Foyle. 1870: Atl. Tangier B.

*Distribution.* Christiansund to Egypt and Gulf of Suez; 0–55 fms.

*Fossil.* Miocene. Turin. Pliocene and Post-tertiary. Scandinavia, Great Britain and Ireland, S. France, Italy, Algeria, Morea, and Rhodes; 0–150 ft.

3. PECTEN ISLANDICUS, Müller.

✓ *P. islandicus*, Müll. Zool. Dan. Prodr. p. 248: G. O. Sars, Moll. reg. arct. Norv. t. 2. f. 2.

‘Porcupine’ Exp. 1869: St. 25 (fragments; semifossil?).

*Distribution.* Arctic seas in both hemispheres, southwards to Bergen and Connecticut, N. Japan; 2-150 fms.

*Fossil.* Pliocene and Post-tertiary. Scandinavia, Scotland, Russia, Gulf of Naples (B. C. v. p. 166), Messina; 20 fms.-470 ft.

4. PECTEN PES-FELIS, Linné.

✓ *Ostrea pes-felis*, L. S. N. p. 1146: Chemnitz, Conch.-Cab. vii. t. 64. f. 612, t. 65. f. 613.

'Porcupine' Exp. 1870: Tangier B. (young).

*Distribution.* G. Gascony to Morocco, Mediterranean, Adriatic, Ægean, Madeira, and Canaries, 'Challenger' Exp. (Fiji Islands); 18-110 fms.

*Fossil.* Pliocene, Italy, Morea, and Rhodes.

5. PECTEN PES-LUTRÆ, Linné.

*Ostrea pes-lutræ*, L. Mant. Plant. p. 547.

*P. septem-radiatus*, B. C. ii. p. 62; v. p. 166, pl. xxiii. f. 1, 1a.

'Lightning' Exp.: St. 2, 4, off Faroe I. (very large valve).

'Porcupine' Exp. 1869: St. 3, 6, 15, 23, 23a, 25, 65. 1870: Atl. 1, 2, 3, 6 (var. *alba*), 8, 9, 10, 13, 16, 17, 26-30; Med. Capo de Gata, Cartagena B., G. Bona, Benzert Road, Rasel Amoush, G. Tunis, Adventure Bank, off Rinaldo's Chair.

*Distribution.* Finmark to the Sea of Marmora, and the Adriatic; 10-300 fms.

*Fossil.* Pliocene and Post-tertiary. Scandinavia, Great Britain and Ireland, Belgium, Vienna Basin, S. France, Africa, Italy, and Rhodes; 0-440 ft.

There are at least a dozen synonyms for this variable species, including *P. septemradiatus*, Müller, *Ostrea inflexa*, Poli, and *P. dumasii*, Payraudeau. The last named variety agrees more nearly with Linné's description of *Ostrea pes-lutræ* in having very small ears, "*Auriculæ vix ullæ s. altera minuta.*" The Linnean name appears to have been first recognized and adopted by the late M. Gay in his 'Catalogue des Mollusques du Département du Var,' 1858. The editors of the 'Journal de Conchyliologie' object to compound names of species; but we have the great authority of Linné for many such names. As to the names of species derived from English persons, unnecessary confusion is avoided by using their ordinary compound names, *e.g.* Wyville-Thomson, the simple surname Thomson being very common and belonging to several naturalists.

6. PECTEN SULCATUS, Müller.

*P. sulcatus*, Müll. Zool. Dan. Prodr. p. 248.

*P. aratus*, B. C. ii. p. 64; v. p. 167, pl. xeix. f. 5.

'Lightning' Exp.: Station 4.

'Porcupine' Exp. 1869: St. 13, 14, 25, 65. 1870: Atl. 1, 2, 3, 24-30; Med. 45, Capo de Gata, Adventure Bank. In some specimens, as well from the Atlantic as from the Mediterranean, the ribs are more knotty or tuberculous than in others.

*Distribution.* Loffoden I. to the Morea, Malta, and the Adriatic; 20–470 fms.

*Fossil.* Pliocene and Post-tertiary. Coralline Crag, Belgium, Biot, Messina; 0–30 ft.

*Ostrea arata* of Gmelin and *P. bruei* of Payraudeau. When I adopted Gmelin's specific name, I overlooked the relative dates of Müller's and Born's publications; that of Müller is anterior by two years, viz. 1776, while Born's was 1778. Müller's description, although short, is unmistakable.

✓ 7. PECTEN OPERCULARIS, Linné.

*Ostrea opercularis*, L. S. N. p. 1147.

*P. opercularis*, B. C. ii. p. 59, pl. ii. f. 1; v. p. 166, pl. xxii. f. 3, 3a.

'Lightning' Exp.: St. 4.

'Porcupine' Exp. 1869: St. 2, 33, 35. 1870: Atl. 1, 2, 3, 8, 9, 10, Setubal B., C. Sagres, 26, 36, Tangier B.; Med. 50, 55, G. Bona, Benzert Road, Rasel Amoush, G. Tunis, Adventure Bank, off Rinaldo's Chair. Specimens have a more or less strongly imbricated sculpture.

*Distribution.* Iceland to the Sea of Marmora, Adriatic, Madeira, Canaries, and the Azores; 5–205 fms. The depth recorded for the variety *audouinii* from the Mediterranean cable is questionable.

*Fossil.* Pliocene and Post-tertiary. Scandinavia, Great Britain and Ireland, Belgium, N. Germany, S. France, Italy, Algeria, Morea, Rhodes, Madeira; 0–600 ft.

✓ 8. PECTEN PHILIPPII, Récluz.

*P. philippii*, Récl. Journ. de Conch. iv. p. 52, t. ii. f. 15, 16 (1853).

'Porcupine' Exp. 1870: Atl. St. Setubal B., C. Sagres, 26, 36; Med. 50, Benzert Road, Rasel Amoush.

*Distribution.* Mediterranean, Adriatic, Madeira, Canaries; 20–100 fms.

*Fossil.* Pliocene. S. Italy and Rhodes.

Distinguishable from *P. opercularis* by its smaller size, more convex or gibbous shape, broader and flattened ribs, and smaller ears. Monterosato altered the specific name to *commutatus*, because *philippii* had been used by Michelotti previously to Récluz for another and a fossil species; but, as Brugnone has lately pointed out, Michelotti's species belong to *Pleuronectia* or *Amussium*. According to Hörnes, that species is the *Pecten duodecimlamellatus* of Bronn, which has precedence of Michelotti's name by eight years.

✓ 9. PECTEN MAXIMUS, Linné.

*Ostrea maxima*, L. S. N. p. 1144.

*P. maximus*, B. C. ii. p. 73; v. p. 169, pl. xxiv.

'Porcupine' Exp. 1870: Atl. St. Vigo B., Tangier B.; Med. Algeiras B., G. Bona, Benzert Road. Young specimens.

*Distribution.* Christiansund to Sicily, Madeira, and the Canaries; laminarian zone to 78 fms.

*Fossil.* Upper and middle Pliocene and Post-tertiary. Scandinavia, Great Britain and Ireland, Holland, Belgium, S. France, Italy, Algeria; 0-106 ft.

It is difficult to separate *P. maximus* from *P. jacobæus*. Are they distinct species?

✓ 10. PECTEN FLEXUOSUS, Poli.

*Ostrea flexuosa*, Poli, Test. utr. Sic. ii. p. 161, t. xxviii. f. 11.

'Porcupine' Exp. 1870: Atl. St. 29; Med. Benzert Road, Rasel Amoush.

*Distribution.* Loire-Inférieure, Atlantic coast of Spain, Portugal, Strait of Gibraltar, Mediterranean, Adriatic, Ægean, Madeira; 2-110 fms.

*Fossil.* Miocene, Pliocene, and Post-tertiary. S. France, Algeria, and Italy.

*P. polymorphus* of Bronn and Philippi.

✓ 11. PECTEN GLABER, Linné.

*Ostrea glabra*, L. S. N. p. 1146.

*O. citrina*, Poli, Test. utr. Sic. ii. t. xxviii. f. 15.

'Porcupine' Exp. 1870: Atl. St. 30; Med. Algesiras B.,

*Distribution.* Portugal to Smyrna, Adriatic, Black Sea, and the Crimea; 2-120 fms.

*Fossil.* Pliocene. S. France, Algeria, Italy, Morea.

*Ostrea sulcata* of Born, and many other synonyms.

✓ 12. PECTEN TIGRINUS, Müller.

*P. tigrinus*, Müll. Zool. Dan. Prodr. p. 248.

*P. tigrinus*, B. C. ii. p. 65; v. p. 167, pl. xxii. f. 2, 2a.

'Lightning' Exp.: St. 2, 5.

'Porcupine' Exp. 1869: St. 23a, 33, 68, the Minch. 1870: Atl. Setubal B.

*Distribution.* Iceland and Norway to Vigo; 5-180 fms.

*Fossil.* Pliocene and Post-tertiary. Norway, Great Britain, Belgium?, Biot, Barcelona, Calabria, and Sicily; 0-130 ft. I give the Belgian localities for this and some other species with considerable hesitation, because I have not yet succeeded in having an opportunity of critically examining and comparing the Belgian fossils which bear the names of recent species. I have already shown (B. C. v. p. 175) that the *Arca pectunculoïdes* of Nyst, from the "sable noir" of Antwerp, is very different from the recent species of that name.

✓ 13. PECTEN STRIATUS, Müller.

*P. striatus*, Müll. Zool. Dan. Prodr. p. 248: B. C. ii. p. 69; v. p. 168, pl. xxiii. f. 4.

'Porcupine' Exp. 1869: St. 6, 9, Galway B., 14, 45a, 45b, 70, Little Minch, near Belfast, off Lerwick.

*Distribution.* Finmark and Faroe I. to Sicily; 5–180 fms.

*Fossil.* Pliocene and Post-tertiary. Scandinavia, Red Crag at Woodbridge, Biot, Italy; 0–130 ft.

Among other synonyms is *P. rimulosus* of Philippi, who identified it with the present species in his letter to Scacchi in 1844. It is not the *P. striatus* of v. Münster, from the Tertiaries of N. W. Germany.

✓ 14. PECTEN TESTÆ, Bivona.

*P. testæ* (Bivona MS.), Philippi, Cat. Moll. Sic. i. p. 11, t. v. f. 17; B. C. ii. p. 67; v. p. 167, pl. xxiii. f. 3.

'Porcupine' Exp. 1869: St. 2, 6, 23a, 25. 1870: Atl. Vigo B., Tangier B.; Med. off Jijeli, Benzert Road.

*Distribution.* Norway to the Ægean, and the Adriatic; 10–130 fms. The depth from which the Mediterranean cable was recovered, with the specimen attached to it, depending on the information received by Prof. A. Milne-Edwards, is doubtful.

*Fossil.* Pliocene. Biot, Monte Mario, and Sicily.

✓ 15. PECTEN SIMILIS, Laskey.

*P. similis*, Lask. Mem. Wern. Soc. i. p. 387, t. viii. f. 8.: B. C. ii. p. 71; v. p. 168, pl. xxiii. f. 5.

'Porcupine' Exp. 1869: St. 1, 3, 6, 9, Galway B., 13, 14, 18, 25, 33, 35. 1870: Atl. 1, 2, 3, 10, 12, Vigo B., 16, 17a, Setnbal B., off C. Sagres, 27–30; Med. Cartagena B., Rasel Amoush (one valve, striated inside more distinctly than usual, and named by me *Pleuromectia levis*), Adventure Bank, off Rinaldo's Chair.

*Distribution.* Finmark to the Gulf of Egina, Adriatic, Madeira, Jamaica, and Corean Sea; 2–300 fms.

*Fossil.* Pliocene and Post-tertiary. Coralline Crag, Glacial bed in Fifehire, Belgium, Plaisantin, S. Italy, Rhodes.

Not *P. pygmaeus* of v. Münster, which is a species of *Amussium*.

✓ 16. PECTEN GROENLANDICUS, G. B. Sowerby.

*P. groenlandicus*, G. B. Sowerby, Thes. Conch. part ii. p. 57, pl. xiii. f. 40 (1842).

'Porcupine' Exp. 1869: St. 23a, 40, 47. 1870: Atl. 6, 8, 9. Young only, and in this state closely resembling *P. similis*; but the sculpture is very different. The latter species is marked by concentric striæ in both valves, while *P. groenlandicus* has in the upper valve numerous impressed lines, arranged lengthwise and irregularly, and the lower valve is microscopically reticulated.

*Distribution.* Arctic Seas in the North Atlantic, from Smith Sound to Bergen and the Gulf of St. Lawrence, White Sea and coasts of Russian Lapland; 5½–1785 fms.

*Fossil.* 82° 27' N. lat., Norway, Scotland, and Maine; from 30–40 ft. in depth to 200 ft. in height.

The shell is far from being "equivalve," as Sowerby described it. *P. vitreus* of Gray, but not Chemnitz's species of that name.

## ✓ 17. PECTEN FRAGILIS, Jeffreys. (Plate XLV. fig. 1.)

*P. fragilis*, Jeffr. in Ann. & Mag. N. H. Nov. 1876, p. 424.

'Porcupine' Exp.: 1869, St. 23a (young, but perfect and living); 1870, Atl. 16, 17 (fragments).

*Distribution*. 'Valorous' Exp.; 1450-1750 fms. Norwegian Arctic Exp. 1876-8; 656-1333 fms. According to Friele there are no ocelli in the edge of the mantle.

## 18. PECTEN VITREUS, Chemnitz.

*Pallium vitreum*, Chemn. Conch.-Cab. vii. p. 335, t. 67. f. 637a.

*Pecten vitreus*, B. C. v. p. 168, pl. xcix. f. 6.

'Lightning' Exp.: St. 6, 7.

'Porcupine' Exp. 1869: St. 3, 4, 5, 6, 13, 23, 23a, 47. 1870: Atl. 1, 2, 3, 6, 8, 9, Vigo B., 16, 17a, off C. Espichel, 24, 26, 27, 28, 28a, 31-34. Some specimens from the same locality are more or less covered with tubercles or short scales on the concentric lines of growth; others are quite smooth and constitute the variety *abyssorum*. The microscopic striæ which radiate from the beak are also sometimes nearly wanting in young specimens.

*Distribution*. Greenland, Iceland, Scandinavia, Shetland, S.W. France, coast of Portugal, Mediterranean, N.E. America, var. *abyssorum* 'Challenger' Exp. (W. Patagonia); 20-600 fms. Herr Friele dredged a specimen at Bergen attached to *Primnoa*, which measured an inch in length and breadth.

*Fossil*. Pliocene and Post-tertiary. Norway, Sicily.

## 1. AMUSSIUM FENESTRATUM, Forbes.

✓ *Pecten fenestratus*, Forb. Rep. Brit. Assoc. 1843, pp. 146, 192.

*P. philippii*, Acton, Ricerche conchilologiche, 1855, f. 1a.

*P. actoni*, v. Martens, Mal. Bl. 1857, p. 194, t. iii. f. 1-3.

'Porcupine' Exp. 1870: Atl. St. 24, 27, 28, 28a, 36; Med. Cartagena B., Adventure Bank, off Rinaldo's Chair. Var. *cancellata*. White and of thinner texture, with the concentric ridges less numerous than the longitudinal striæ, which are equal in size; it is also destitute of the inside ribs. 'Porcupine' Exp. 1869, St. 37, from the great depth of 2435 fathoms; a living specimen. A remarkable monstrosity occurred in an upper valve from the Adventure Bank having the proper sculpture of the lower valve, viz. being concentrically and closely striated; and the upper valve of another specimen has partly its own decussated sculpture and partly that of the lower valve. The sculpture is very variable, and is more or less deficient as well on the outside as in the inside of both valves; and the ears of the lower valve are nearly equal in two specimens.

*Distribution*. Coast of Portugal, Mediterranean, and Ægean; 50-250 fms.

*Fossil*. Pliocene. Sicily and Rhodes.

*P. inequisculptus*, Tiberi. *P. concentricus* of Forbes is the lower valve of either this species or *A. hoskynsi*. In neither of these species is the shell "æquivalvis," as described by him; nor did he notice the

inside sculpture. *P. alaskensis* of Dall, from Port Etches in the North Pacific is allied to the present species; but it differs not only in its much greater size, but also in the external sculpture, and in the number of internal ribs, which are from 17 to 21 in *A. fenestratum* and from 31 to 35 in *A. alaskense*.

## 2. AMUSSIUM HOSKYNSI, Forbes.

✓ *Pecten hoskynsi*, Forb. Rep. Brit. Assoc. 1843, p. 192; G. O. Sars, Moll. reg. arct. Norv. p. 20, t. 2. f. 1, 1 a-e.

'Porcupine' Exp. 1869: St. 23, 39, 65. 1870: Atl. 1, 2, 3, 24-30; Med. 55. In specimens from the last-named station (1456 fms.) the upper valve is smooth or nearly so, and the inside ribs are entirely or partly absent. The microscopic sculpture of the young is very beautiful.

*Distribution.* Novaya Zembla, off Spitzbergen and Jan Mayen I., E. coast of Greenland, Norway, Sicily, Ægean, and off the Azores; 30-650 fms. Arctic specimens are very large, measuring fully three quarters of an inch.

*Fossil.* Pliocene and Post-tertiary. Norway, Calabria, and Sicily. Syn. *Pecten fimbriatus* and *P. antiquatus* (upper and lower valves), Philippi, and *P. imbrifer*, Lovén. The sculpture is variable, although the upper valve is usually more or less covered lengthwise with rows of pustules or frills, and the lower valve is closely striated in the line of growth. The full number of internal ribs is 17. *P. pustulosus* of Verrill, from the coast of New England, is probably this species; but I have not been able to see more than a single specimen, which was smooth inside.

## 3. AMUSSIUM LUCIDUM, Jeffreys.

*Pleuronectia lucida* (Jeffr.), Wyville-Thomson, Depths of the Sea, p. 464, f. 78.

*A. lucidum*, Jeffr., in Ann. & Mag. Nat. Hist. Nov. 1876, p. 425.

'Porcupine' Exp. 1869: St. 39, 41, 420. 1870: Atl. 3a, 16, 17, 17a.

*Distribution.* 'Valorous' Exp., 'Challenger' Exp. (west of Azores and Pernambuco), Gulf of Mexico; 156-1450 fms.

Var. *striata*. Upper valve marked by fine, close-set, and more or less distinct longitudinal striæ; 'Porcupine' Exp. 1870, Atl., St. 17a; 'Challenger' Exp. (off Marion I.), 1375 fms. The number of inside ribs varies from 9 to 15.

## A. Shell equilateral, completely closed. *Limatula*.

### 1. LIMA SARSII, Lovén.

*Limea sarsii*, Lov. Ind. Moll. Scand. p. 32.

*Lima sarsii*, B. C. ii. p. 78; v. p. 169, pl. xxv. f. 1.

'Lightning' Exp.: St. 2, 5.

'Porcupine' Exp. 1869: St. 15, 23a, 65. 1870: Atl. 1, 2, 3, 6, 24, 26-30; Med. 55, Adventure Bank.

*Distribution.* Vadsoe to Shetland, and throughout the Mediterranean; 80–300 fms.

*Fossil.* Pliocene. Sicily, Rhodes.

Probably the *Lima* (*Limatula*) *crassa* of Forbes; but his diagnosis was incomplete and unsatisfactory. He did not even notice the peculiar imbricated sculpture caused by the transverse or concentric striae. Lovén not only described his species accurately and with sufficient fulness to ensure identification, but he rightly assigned it to the genus (or rather subgenus) of Bronn, which he characterized by having the hinge-plate denticulated.

At Station 26 of the 'Porcupine' Expedition of 1870 occurred a minute oval valve (1 millimetre =  $\frac{1}{25}$  of an inch long), which differs from a young *L. sarsii* of the same size in being more solid, and apparently adult. It is slightly ribbed lengthwise, instead of being imbricated or nodulous; the hinge is not shouldered; and the hinge-plate is very broad and obtusely triangular, with a proportionally large cartilage-pit. It may be provisionally named *L. subcostata*.

## 2. LIMA ELLIPTICA, Jeffreys.

*Lima elliptica*, B. C. ii. p. 81; v. p. 169, pl. xxv. f. 2.

'Lightning' Exp.: St. 2, 5.

'Porcupine' Exp., 1869: St. 3, 13, 61, the Minch. 1870: Atl. 3, off C. Sagres, 27, 28, 28a, 36, Tangier B.; Med. Rassel Amoush, Adventure Bank, off Rinaldo's Chair.

*Distribution.* Loffoden I. to the Archipelago, Adriatic, Newfoundland, and N. Japan; 6–400 fms.

*Fossil.* Pliocene and Post-tertiary. Norway, Coralline Crag, Belgium, Hungary, Italy, Rhodes; 0–100 ft.

This may be partly the *Ostrea nivea* of Brocchi—not the fossil (which has no furrow), but the species noticed by him as recent, and measuring half an inch in length. His fossil and recent species of the same name were evidently different; and the former only was described and figured. The *O. nivea* of Renier cannot be recognized; his work is a mere catalogue of names. *L. (Limatula) cucneata* of Forbes is described as "auriculis inæqualibus." In the present species, as well as in the next, the ears are quite equal.

## 3. LIMA SUBOVATA, Jeffreys. (Plate XLV. f. 2.)

*Lima subovata*, Jeffr. in Ann. & Mag. N. H. Nov. 1876, p. 427.

'Porcupine' Exp. 1869: St. 19, 20, 23, 23a, 47 (var. *angustior*; smaller, oblong, and narrower). 1870: Med. 55.

*Distribution.* 'Valorous' Exp., 'Challenger' Exp. (off the Azores); Norwegian arctic Exp. 1878; Dutch arctic Exp., Sicily; 16–1450 fms. Arctic specimens are gigantic compared with those from Sicily, being about three quarters of an inch in length.

*Fossil.* Pliocene. Palermo.

## 4. LIMA SUBAURICULATA, Montagu.

✓ *Pecten subauriculata*, Mont. Test. Brit. Suppl. p. 63, t. 29. f. 2.*Lima subauriculata*, B. C. ii. p. 82; v. p. 169, pl. xxv. f. 3.

'Lightning' Exp.: St. 2, 5, 6, 7.

'Porcupine' Exp. 1869: St. 14, 23 a, 62. 1870: Atl. 2, 9, off C. Sagres, 26-30, 36, Tangier B.; Med. 55, off Rinaldo's Chair.

*Distribution.* Wellington Channel, Davis Strait, Novaya Zembla, Iceland to Gibraltar, Mediterranean, Adriatic, Ægean, Canary Isles, Labrador to Sable I., and W. coast of N. America; 10-1785 fms.*Fossil.* Pliocene and Post-tertiary. Norway, Coralline Crag, Belgium, Vienna Basin, Italy, and Rhodes; 0-80 ft.*Synonyms.* *L. sulcata* (Leach), Möller; *L. elongata*, Forbes; *L. sulculus* (Leach), Lovén; *L. uncostata*, Leach, and *L. nivea* (Remier), Philippi. Forbes has both *L. subauriculata* and *L. elongata* in his Report on Ægean Invertebrata, giving 15-30 fms. as the range of depth for the former species, and 55-140 fms. for the latter.

B. Shell inequilateral, more or less gaping or open at the sides.

*Mantellum.*

## 5. LIMA LOSCOMBII, G. B. Sowerby.

*Lima loscombii*, Sow., Gen. Sh. (*Limu*), f. 4: B. C. ii. p. 85, pl. ii. f. 2, 2 a; v. p. 178, pl. xxv. f. 4.

'Porcupine' Exp. 1869: St. 6, Galway B., 68. 1870: Atl. Vigo B., 31-34, Tangier B.; Med. 55, Benzert Road.

*Distribution.* Loffoden Isles to the Adriatic and Ægean, Teueriffe; 5-205 fms.*Fossil.* Pliocene and Post-tertiary. Norway, Red and Coralline Crag, Belgium, Italy, Rhodes; 0-240 ft.

## 6. LIMA HIANS, Gmelin.

*Ostrea hians*, Gmel., L. S. N. ed. xiii. p. 3332.*L. hians*, B. C. ii. p. 87; v. p. 170, pl. xxv. f. 5.

'Porcupine' Exp. 1870: Atl. St. Vigo B., 36.

*Distribution.* Loffoden Isles to the Morea, Adriatic, Mogador, Madeira, Canaries, and Azores; 0-110 fms.*Fossil.* Pliocene and Post-tertiary. Coralline Crag, Scotland, Ireland, Vienna Basin, Sicily, and Rhodes.

## ✓ 7. LIMA EXCAVATA, Fabricius.

*Ostrea excavata*, Fabr. in Schröter's Naturg. t. ii. p. 117.*Excavata fabricii*, Chemn. Conch.-Cab. t. 68. f. 654.

'Lightning' Exp., St. 5. A hinge and part of the valves, quite fresh and united by the cartilage. Perhaps taken by a fish on the Norwegian coast, and carried out to sea.

'Porcupine' Exp. 1870: Atl. St. 22, 24, 25. Fragments of old and young specimens. Semifossil?

*Distribution.* Scandinavia, from Finmark to Bohuslän. 'Chal-

lenger' Exp. (W. Patagonia and off Japan); 10-775 fms. Herr Friele informs me that by sinking a dredge in Osterfiord, almost perpendicularly, to the depth of 350 fathoms, he has brought up this grand and beautiful species, with also living specimens of *Mytilus edulis* and *Littorina rudis*, and that *L. excavata* attaches itself by a strong byssus to rocks close to the shore.

*Fossil.* Pliocene and Post-tertiary. Norway, Altavilla?, and Sicily.

Apparently *L. solida* of Calcare.

#### Family V. AVICULIDÆ.

##### ✓ AVICULA HIRUNDO, Linné.

*Mytilus hirundo*, L. S. N. p. 1159.

*A. hirundo*, B. C. ii. p. 95; v. p. 170, pl. xxv. f. 6.

'Porcupine' Exp. 1870: Atl., St. 10, 13, off C. Sagres, 27, 28, 28a, 36, Tangier B.; Med. off Jijeli, Rasel Amoush.

*Distribution.* Southern coasts of England to the Adriatic and Ægean, Madeira, Canaries, Azores; 0-205 fms.

*Fossil.* Pliocene. Coralline Crag, S. Italy.

One of the two specimens still preserved in the Linnean collection of shells as "*Mytilus hirundo*," is certainly the present species. In the 'Systema Naturæ' the first reference is to the 'Mus. Ulr. Reg.,' where the description agrees with the European species, although no habitat is given; the second reference is to Lister's 'Hist. Conch.,' who cites D'Argenville for the vernacular name "Dattici," used by the Genoese. Lamarek called the species *A. tarentina* and *A. atlantica*, describing the former as "valvis æqualibus," and the latter (more appropriately) as "valvis inæqualibus."

##### PINNA RUDIS, Linné.

*Pinna rudis*, L. S. N. p. 1159: B. C. ii. p. 99, pl. iii. f. 1, and frontispiece; v. p. 170, pl. xxvi.

'Porcupine' Exp. 1870: Atl., St. 13, Vigo B., off C. Sagres, Gibraltar B., Tangier B.; Med. 50, 50a, Rasel Amoush.

*Distribution.* Great Britain and Ireland to the Adriatic and Morea, Madeira, Canaries, and Azores; 0-80 fms.

*Fossil.* Pliocene. Coralline Crag (fragments), Belgium, Italy, and Rhodes.

There is no end of synonyms. Poli, Payraudeau, Philippi, and many other conchologists of repute have adopted the Linnean name *rudis*. The shape and sculpture are extremely variable.

#### Family VI. MYTILIDÆ.

##### 1. MYTILUS EDULIS, Linné.

✓ *Mytilus edulis*, L. S. N. p. 1157: B. C. ii. p. 104, pl. iii. f. 2; v. p. 171, pl. xxvii. f. 1.

'Porcupine' Exp. 1870: Atl. St. Vigo B. and Gibraltar B. Valves only.

*Distribution.* Circumpolar, and throughout the North Atlantic, Adriatic, Mediterranean to Smyrna, North Pacific to Mexico, Kerguelen Land, 'Challenger' Exp. (New Zealand and Falkland I.); usually littoral or tidal, but occasionally living below the laminarian zone.

*Fossil.* Pliocene and Post-tertiary. Greenland, Iceland, Scandinavia, Great Britain and Ireland, Belgium, S. France, Italy to Ustica I., Labrador and N.E. America southwards to Florida; 0-1360 ft.

This very common species has been called by nearly twenty names. It varies greatly in size, from the stunted form (*incurvata*) to the arctic variety (*gigantea*), specimens of the latter being nine or ten inches long.

## 2. MYTILUS PICTUS, Born.

*Mytilus pictus*, Born, Test. Mus. Cæs. p. 111 (1778); p. 127, t. vii. f. 6, 7 (1780).

'Porcupine' Exp., 1870: Med. St. Capo de Gata, 51, Adventure Bank. Valves only.

*Distribution.* S. W. and S. France, S. Spain, Adriatic, Algiers, Malta, Morocco, W. and S. Africa, Canaries; 0-10 fms.

*M. africanus* of Chemnitz and *M. afer* of Gmelin.

## 3. MYTILUS ADRIATICUS, Lamarck.

*Mytilus adriaticus*, Lam. An. s. Vert. vi. p. 112: B. C. ii. p. 116; v. p. 171, pl. xxvii. f. 4.

'Porcupine' Exp. 1869: St. Loch Foyle. 1870: Atl. Vigo B., Tangier B.; Med. Benzert Road, Adventure Bank.

*Distribution.* Finmark to Malta and Egypt, Adriatic, Canaries; 2-50 fms.

*Fossil.* Pliocene and Post-tertiary. Belfast, Italy.

Many synonyms, but all now obsolete.

## 4. MYTILUS INCURVATUS, Philippi.

*Modiola incurvata*, Phil. En. Moll. Sic. i. p. 72, t. 4. f. 20.

'Porcupine' Exp. 1870: Med. St. 50 a. A single living specimen. The byssus is very long.

*Distribution.* Benicarlo in Valencia; 15 fms.

*Fossil.* Pliocene. Sicily.

My specimen, which I have considered the same species as Philippi's fossil, undoubtedly belongs to the species lately described and figured as *Modiola martorelli* by Dr. Hidalgo in his excellent work on the marine Mollusca of Spain, Portugal, and the Balearic Isles. Through the kindness of the Abbé Brugnone, I have now had an opportunity of carefully comparing his fossil specimen from Sicily with my recent specimen from the 'Porcupine' Expedition of 1870; and I can see no difference between them, except that the former has a more curved or arched contour. But this is evidently a variable character in the recent form, judging from my inspection at Palermo of a specimen sent by Dr. Hidalgo to the Marquis de Mon-

terosato, in which some degree of curvature is observable. After I had written the above I received from Dr. Hidalgo (to whom my best thanks are due for this and other favours) a fine specimen of his *M. martorelli*, which is considerably incurved in front, with a corresponding arcuation at the back; and it exactly resembles Brugnone's fossil specimen.

5. *MYTILUS MODIOLUS*, Linné.

*Mytilus modiolus*, L. S. N. p. 1158: B. C. ii. p. 111; v. p. 171, pl. xxvii. f. 2.

'Porcupine' Exp. 1870: Atl. Setubal B. A fragment, perhaps fossil.

*Distribution.* Iceland to the west coast of France, White Sea, Labrador to New York, Behring Strait to California and Japan, not Greenland nor Spitzbergen; 0-100 fms. Von Schrenck gives as synonyms *Modiola philippinarum* of Hanley and *Modiola australis* of Gray, the former from the Philippine Isles, and the latter from Australia. If these identifications are correct, they would imply a more extensive distribution.

*Fossil.* Pliocene and Post-tertiary. Scandinavia, Great Britain and Ireland, Belgium, Italy, Labrador to Nantucket I.; 0-470 ft.

6. *MYTILUS BARBATUS*, Linné.

*Mytilus barbatus*, L. S. N. p. 1156: B. C. ii. p. 114; v. p. 171, pl. xxvii. f. 3.

'Porcupine' Exp. 1870: Atl. St. Vigo B.; Med. Benzert Road (valves).

*Distribution.* S. & W. England, Wales, and Ireland, southwards to Malta and Alexandria, N. Japan and Gulf of Yedo; 0-95 fms.

*Fossil.* Pliocene. Red Crag, and Italy.

7. *MYTILUS PHASEOLINUS*, Philippi.

*Modiola phaseolina*, Phil. Moll. Sic. p. 51, t. xv. f. 14.

*Mytilus phaseolinus*, B. C. ii. p. 118; v. p. 171, pl. xxvii. f. 5.

'Porcupine' Exp. 1869: St. 1, 2. 1870: Atl. Vigo B., 25, off C. Sagres, 26, 30, Tangier B.; Med. Cartagena B., 50, 51, Rasel Amoush, off Rinaldo's Chair.

*Distribution.* Iceland and Finmark to the Ægean and Adriatic; 0-3000 fms.

*Fossil.* Pliocene and Post-tertiary. Norway, Coralline Crag, Belgium, Italy, and Rhodes; 0-100 ft.

Among other synonyms are probably *Mytilus barbatus* of Müller and Fabricius, but not of Linné, and certainly *Modiola pusio* of Mörch, but not of Philippi.

I dredged a minute valve of *Mytilus bidens*, Linné, in the 'Porcupine' Expedition of 1870, at Station 17a. A Foraminifer (*Rhabdammina abyssorum*, M. Sars) was attached to it. *M. bidens* is a West-Indian species, and has been acclimatized at Barcelona.

## ✓ 1. MODIOLARIA MARMORATA, Forbes.

*Mytilus marmoratus*, Forb. Mal. Mon. p. 44.

*Modiolaria marmorata*, B. C. ii. p. 122, pl. iii. f. 3; v. p. 171, pl. xxviii. f. 1.

'Porcupine' Exp. 1869: St. 9, the Minch. 1870: Atl. Vigo B., Tangier B.; Med. Cartagena B., Capo de Gata, Adventure Bank.

*Distribution.* Bergen to Smyrna, Adriatic, Mogador, Gulf of Suez and Persian Gulf, Canaries, N. Pacific, perhaps S. Carolina as *Crenella lateralis* of Say; 10-150 fms.

*Fossil.* Pliocene and Post-tertiary. Coralline and Red Crag, Belfast, Belgium, Italy.

Cantraine's specific name *subpicta* has precedence of *marmorata* by three years; and that given by Say, *lateralis* (if applicable to the present species), is still older; but *marmorata* is now in general use.

## ✓ 2. MODIOLARIA DISCORS, Linné.

*Mytilus discors*, L. S. N. p. 1159.

*Modiolaria discors*, B. C. ii. p. 126; v. p. 171, pl. xxviii. f. 3.

'Lightning' Exp.: St. 1, 3.

*Distribution.* Arctic ocean in both hemispheres, 'Valorous' Exp., Iceland to Guernsey, west coast of France, Piedmont, Ægean, N.E. America from Labrador to Cape Cod, and N. Pacific southwards to Oregon and Japan; 0-1785 fms.

*Fossil.* Pliocene and Post-tertiary. Scandinavia, Great Britain, Vienna Basin?, N.E. America; 0-100 ft.

*Modiola lævigata* and *substriata* of Gray and *Modiola lævis* of Beck are varieties of the present species, and connected by intermediate gradations with the typical form.

## ✓ 3. MODIOLARIA NIGRA, Gray.

*Modiola nigra*, Gray, Suppl. to App. to Parry's first voyage, p. cexliv.

*Modiolaria nigra*, B. C. ii. p. 128; v. p. 171, pl. xxviii. f. 4.

'Lightning' Exp.: St. off the Faroe Isles.

'Porcupine' Exp. 1869: St. off Lerwick.

*Distribution.* With *M. discors* as arctic, Iceland to the Dogger bank, Holland?, N.E. and N.W. America, Novaya Zembla, Sea of Okhotsk; 7-350 fms.

*Fossil.* Post-tertiary. Iceland, Norfolk?, Scotland, N.E. America.

This may have been the *Mytilus striatulus* of Linné's 'Mantissa,' as Beck supposed; but the term "uidentato" makes it doubtful. It is the *Modiola nexa* of Gould.

## ✓ 4. MODIOLARIA SUBCLAVATA, Libassi.

*Modiola subclavata*, Lib. Mem. Conch. foss. in Atti Pan. iii. (1859), p. 13, f. 7.

'Porcupine' Exp. 1870: Atl. St. Vigo B., Tangier B. Valves only.

*Distribution.* Brittany, G. Gascony, N. Spain, Provence, Canaries ; 12-50 fms.

*Fossil.* Pliocene. Siena, Palermo.

*Modiola gibberula* of Cailliaud, and *Lithodomus semigranatus* of Reeve. Differs from *Modiolaria petagnæ* (with which it has been found) in size, shape, sculpture, and the prolongation of the terminal beard-like epidermis.

CRENELLA DECUSSATA, Montagu.

*Mytilus decussatus*, Mont. Test. Brit. Suppl. p. 69.

✓ *Crenella decussata*, B. C. ii. p. 133, pl. iii. f. 4 ; v. p. 172, pl. xxviii. f. 6.

'Lightning' Exp. : St. 4, 5.

'Porcupine' Exp. 1870 : Med. Adventure Bank. Valves, smaller than North-Atlantic specimens.

*Distribution.* Spitzbergen to the coasts of Northumberland and co. Antrim, Novaya Zembla, White Sea, and coasts of Russian Lapland, Davis Strait to New England, N. Pacific (Catalina I. and Corea); 0-1750 fms.

*Fossil.* Pliocene and Post-tertiary. Norway, Scotland, Sicily ; 0-40 ft.

DACRYDIUM VITREUM (Holböll), Möller.

*Modiola? vitrea* (Holböll), Möll. Ind. Moll. Grœnl. p. 19.

✓ *Dacrydium vitreum*, Torell, Spitzb. Moll. p. 138, t. i. f. 2 a, b.

'Porcupine' Exp. 1869 : St. 23, 23 a, 25, 37, 38, 65. 1870 : Atl. 16, 17, 17 a, 22, 30.

*Distribution.* Swedish arctic Exp. 1868, 'Valorous' Exp. 1875, Novaya Zembla, Norwegian arctic Exp. 1877 and 1878, 'Challenger' Exp. (between the Azores and Bermuda), Norway from Vadsoe to Christianiafiord, both sides of the Mediterranean, Gulf of St. Lawrence, New England ; 30-2750 fms.

*Fossil.* Pliocene and Post-tertiary. Elie in Fifeshire, Cassel, Palermo.

*Modiola pygmæa* of Philippi and *Dacrydium hyalinum* of Monterosato. I cannot discover any difference except size to distinguish Mediterranean from North-Atlantic specimens. As to the name and characteristics of the genus *Dacrydium*, I would refer to the 'Annals and Magazine of Natural History' for November 1876, p. 429.

This remarkable and pretty mollusk makes a nest (like *Modiolaria discors* and *Lima hians*) consisting of a narrow tubular case twice the length of the shell. The case is lined with a delicate membrane, and coated with minute Foraminifera, fragments of sponge, and coccospheres, which are firmly agglutinated. The *Dacrydium* inhabits the broader and lower half of the case, its front or "ventral" margin lying in the direction of the narrower part or opening.

IDAS ARGENTEUS, Jeffreys. (Plate XLV. fig. 3.)

*Idas argenteus*, Jeffr. in Ann. & Mag. N. H. Nov. 1876, p. 428.

'Porcupine' Exp. 1870, Atl. St. 16.

*Distribution*. 'Valorous' Exp.; 1450 fms.

Family VII. ARCIDÆ.

1. ARCA BARBATA, Linné.

*A. barbata*, L. S. N. p. 1140: Poli, Test. utr. Sic. ii. p. 135, t. xxv. f. 6, 7: B. C. ii. p. 183; v. p. 176.

'Porcupine' Exp. 1870: Atl. St. Gibraltar B.

*Distribution*. Atlantic coasts of France from Quimper to Rochelle, Cadiz, Mogador, throughout the Mediterranean and Adriatic; 2-100 fms.

*Fossil*. Miocene and Pliocene. S.W. and S. France, Vienna Basin, Galicia, Transylvania, Volkynia, Italy, Morea, Cyprus and Rhodes, Madeira.

2. ARCA LACTEA, Linné.

*A. lactea*, L. S. N. p. 1141: B. C. ii. p. 177; v. p. 175, pl. xxx. f. 5.

'Porcupine' Exp. 1870: Atl. St. Vigo B., 36, Tangier B., Gibraltar B.; Med. 50, 55, Adventure Bank.

*Distribution*. Berwick B. and Oban southwards to Mogador, and eastwards to the Morea, Adriatic, Red Sea, Senegal, Canaries; 0-150 fms.

*Fossil*. Miocene, Pliocene, and Post-tertiary. England and Ireland, S.W. and S. France, Podolia, Vienna Basin, Transylvania, Italy, Cyprus and Rhodes; 0-600 ft.

Several obsolete synonyms.

3. ARCA NODULOSA, Müller.

*A. nodulosa*, Müll. Zool. Dan. Prodr. p. 247: B. C. ii. p. 180; v. p. 176, pl. c. f. 2.

'Lightning' Exp.: St. 2, 4, 5.

'Porcupine' Exp. 1869: St. 13, 14, 51, 61, 65. 1870: Atl. 3, 9, 16, 17 a, 24, 26-29; Med. 45, 55, 58, Adventure Bank.

*Distribution*. Loffoden Isles to the Ægean, Adriatic, Josephine Bank, Canaries, G. Mexico; 10-700 fms.

*Fossil*. Pliocene and Post-tertiary. Norway, S. France, Italy; 0-100 ft.

Having carefully examined and compared more than one hundred specimens from the North Atlantic and Mediterranean, I am convinced that *A. scabra* of Poli is merely a coloured variety of the present species. Some specimens are oval, others oblong; the angle of the hinge-line on either side is of different degrees of acuteness or obtuseness; and the texture and sculpture are finer or coarser according to the nature of the locality and sea-bottom. Specimens from the Gulf of Mexico are undistinguishable from Norwegian. In

a fossil state it is the *A. aspera* of Philippi. I must admit, however, the great difficulty of deciding whether certain species ought to be united or separated. This cannot be attempted without sufficient materials and experience.

#### 4. ARCA TETRAGONA, Poli.

✓ *A. tetragona*, Poli, Test. utr. Sic. ii. p. 137, t. xxv. f. 12, 13; B. C. ii. p. 180, pl. iv. f. 5, 5a; v. p. 176, pl. xxx. f. 6, 6a.

'Porcupine' Exp. 1870: Atl. St. Vigo B., 26, Tangier B.; Med. 55, Benzert Road, Rasel Amoush, Adventure Bank, off Rinaldo's Chair.

*Distribution.* Finmark to Mogador, the Adriatic, Mediterranean, Aegean, Madeira, Canaries, Azores, 'Challenger' Exp. (Fernando Noronhas); 0-450 fms.

*Fossil.* Pliocene and Post-tertiary. Norway, Great Britain and Ireland, Belgium, S. France, Italy, and Madeira,

Synonyms rather numerous, but none worth recording. *A. tetragona* was apparently the small Norwegian species noticed by Linné as resembling *A. tortuosa*, and to which Müller and Pennant gave the latter name.

#### 5. ARCA NOÆ, Linné.

✓ *A. noæ*, L. S. N. p. 1140 (partly); Poli, Test. utr. Sic. t. xxiv. f. 1, 2.

'Porcupine' Exp. 1870: Med. St. Benzert Road.

*Distribution.* Morbihan and Charente Inférieure, Cadiz, throughout the Mediterranean to Egypt, Adriatic, Red Sea, Teneriffe, N. Carolina to West Indies; 0-100 fms.

*Fossil.* Miocene and Pliocene. Vienna Basin, S. France, Algiers, Italy, Morea, Rhodes, Cyprus, and the Azores.

Marketable and eaten at Spezzia, Venice, Naples, and Malta.

#### 6. ARCA ANTIQUATA, Linné.

*A. antiquata*, L. S. N. p. 1141 (partly): Poli Test. utr. Sic., t. xxv. f. 14, 15.

'Porcupine' Exp. 1870: Atl. St. Setubal B., 22, C. Sagres, 26, 30, 36, Tangier B.; Med. 10, 55, G. of Bona, Benzert Road, Rasel Amoush, Adventure Bank.

*Distribution.* Mogador and throughout the Mediterranean from Gibraltar to the Sea of Marmora, Adriatic, Red Sea to Madeira, Canaries, New England from Cape Cod southwards; 20-100 fms.

*Fossil.* Miocene and Pliocene. N.W. Germany, Vienna Basin, S.W. and S. France, Barcelona, Malaga, Algiers, Italy, and Morea.

This is assuredly the *A. antiquata* of Poli. Linné founded his species on the wretched and unsatisfactory figures of Bonanni and other antiquated conchologists. It is also in part the *A. antiquata* of Lamarck; his *A. dilurii* was described from an Eocene species, and is different. Mayer proposed *polii* for our shell; but Brugnone says that two species were included under that name. Judging from

Say's description of *A. transversa* and the figures lately given by Binney and Tryon, as well as from specimens which Mr. Dall has kindly sent me, I am inclined to consider it either the same as the present species or at most a variety of it. In Weinkauff's collection of Algerian shells is a specimen three and a half inches long, with 32 ribs, the usual number being 28. A monstrosity in the same collection was named by M. Crosse *A. weinkauffi*. There are several other synonyms.

#### 7. ARCA OBLIQUA, Philippi.

✓ *A. obliqua*, Phil. Moll. Sic. ii. p. 43, t. xv. f. 2: B. C. ii. p. 175; v. p. 175, pl. xxx. f. 4.

'Lightning' Exp.: St. 5.

'Porcupine' Exp. 1869: St. 14, 15, 25, 65. 1870: Atl. 2, 3, 24, 25, C. Sagres, 26-30, 36; Med. 45, 55, 58, Adventure Bank, off Rinaldo's Chair.

*Distribution.* Bergen and Shetland to the Ægean, Azores; 30-600 fms.

*Fossil.* Pliocene. S. France, Calabria, and Sicily.

Having now reexamined a great number of recent and fossil specimens from various localities, I must separate this from the next species for the following reasons:—*A. obliqua* is not merely much smaller, but it is shorter (measured from the beak to the front margin), and more sharply angulated on the anterior side; the striae are nodulous; and the teeth are more numerous, and straight instead of being set obliquely on the anterior side, as in *A. glacialis*. Both species are somewhat inequivalve. Some specimens of *A. obliqua* have the inside of the front margin regularly and closely denticulated.

#### ✓ 8. ARCA GLACIALIS, Gray.

*A. glacialis*, Gray in Suppl. App. Parry's first voyage, p. ccxlv; Torell, Spitzb. Moll. t. ii. f. 7, a, b.

'Porcupine' Exp. 1869: St. 23 a, 89. Valves only, and perhaps semifossil relics of the last glacial epoch.

*Distribution.* Arctic seas in both northern hemispheres, Iceland, and G. of St. Lawrence; 25-1622 fms.

*Fossil.* Post-tertiary. Scandinavia, Maine; 0-240 ft.

Not *A. glacialis* of Mighels.

#### 9. ARCA PECTUNCULOÏDES, Scacchi.

✓ *A. pectunculoïdes*, Sc. Ann. Civ. due Sic. vii. p. 82 (1833): B. C. ii. p. 171; v. p. 175, pl. xxx. f. 3.

'Lightning' Exp.: St. 2, 5, 7.

'Porcupine' Exp. 1869: St. 1, 6, 14, 15, 17, 23, 25, 61, 62, 65, off Lerwick. 1870: Atl. 1, 2, 3, 6, 8, 9, 12, 13, 14, Setubal B., 24-34; Med. 45, Cartagena B., 55, Benzert Road, Adventure Bank, off Rinaldo's Chair.

*Distribution.* Davis Strait to G. of St. Lawrence and Halifax.

'Valorous' Exp., Spitzbergen, Loffoden Isles to G. of Egina, 'Challenger' Exp. (off Culebra I., Danish West Indies); 20-1170 fms. *Fossil*. Pliocene and Post-tertiary. Norway, Coralline Crag (not Belgian), S. France, Italy, Rhodes; 0-100 ft.

Var. *septentrionalis*. Larger, more triangular and oblique, and finely striated lengthwise, but not reticulated.

This form resembles that of the next species.

'Lightning' Exp.: St. 135.

'Porcupine' Exp. 1869: St. 23 a. 1870: Atl. 16, 17, 17 a.

*Distribution*. 'Bulldog' Exp., Norwegian arctic Exp. 1876, 1877, and 1878, Dutch arctic Exp., Finmark; 146-656 fms.

*Fossil*. Pliocene. Palermo and Messina, with the typical form.

Risso described this species in 1826 as *A. grenophia*; but the name may be considered obsolete. It is also the *A. raridentata* of Searles Wood.

10. *ARCA FRIELEI*, Jeffreys. (Plate XLV. figs. 4, 4 a.)

✓ *A. frielei* (Jeffr.), Friele in Mag. f. Naturvid. xxiii. h. 3, p. 2 (1877).

'Porcupine' Exp. 1869: St. 65.

*Distribution*. Norwegian arctic Exp., 1876-8; 459-1333 fms.

Named in honour of Herr Herman Friele of Bergen, who undertook with such ability the charge of the Mollusca in the last-mentioned expeditions. This and the preceding two species belong to the section or subgenus *Cucullæa*, in which the teeth are comparatively few and placed obliquely. *A. frielei* has been lately figured in the Jahrb. d. D. malak. Ges. Ht. ii. 1879, t. 4. f. 9; but the hinge is represented as toothless, and I therefore have it refigured.

*GLOMUS NITENS*, Jeffreys. (Plate XLV. figs. 5, 5 a.)

*G. nitens*, Jeffr. in Ann. & Mag. N. H. Nov. 1876, p. 433.

'Porcupine' Exp. 1869: St. 16, 19 a, 20, 21, 22, 30, 31, 39.

*Distribution*. 'Valorous' Exp.; 1750 fms.

The genus *Glomus* is remarkable for its globular shape, its elongated and slanting cartilage, and the teeth being few and set obliquely.

#### SILICULA<sup>1</sup>, Jeffreys.

SHELL oval or oblong, open at the anterior or longer end: *cartilage* internal, minute: *teeth* laminar, parallel with the hinge-line, and not at right angles to it or diagonal, as in other genera of the *Arca* family.

I at first thought of *Phaseolus* as an appropriate generic name; but as that is so well known in Botany, I have substituted *Silicula* for the Mollusk. The type, which I will now describe, somewhat resembles an *Estheria* in shape; but the valves of the carapace in the Crustacean are punctated, and there is no true hinge. The Abbé Brugnone and the Marchese di Monterosato have discovered in the Tertiary formation at Ficarazzi, near Palermo, a minute fossil species of *Silicula*, for which the name *ovata* is proposed.

<sup>1</sup> A little pod.

SILICULA FRAGILIS<sup>1</sup>, Jeffreys. (Plate XLV. figs. 6, 6a.)

BODY clear white; *foot* axe-shaped.

SHELL ensiform or obliquely oblong, inequilateral, compressed, thin, glossy, nacreous, and semitransparent: *sculpture* extremely fine and numerous but irregular concentric striæ, which are only observable with a magnifying glass; there are also occasional lines of growth: *colour* white, under a pale brownish-yellow epidermis: *margins* nearly straight at the back on the anterior side, rounded at the other side, extended and wedge-shaped at the anterior side, the extremity of which is truncated, with a slight notch or indentation in the middle, gradually curved in front: *beaks* placed near the smaller end, at about one third the length of the back; they are small, rather prominent, and calyciform: *lunule* well defined, lance-head-shaped, and elongated: *ligament* none: *cartilage* and pit oblique: *hinge-line* long, nearly straight on the anterior side, and gently curved on the other side: *hinge-plate* rather narrow: *teeth* elongated, four on each side, somewhat like the lateral teeth in *Tellina*, but overlapping one another, and not continuous: they are of different lengths, those at each end being the shortest and strongest: *inside* polished and iridescent, microscopically fretted towards the front margin: *scars* inconspicuous. L. 0.15, B. 0.3.

'Porcupine' Exp. 1869: St. 16, 28.

A. More or less angulated or pointed at the longer end.

## ✓ 1. LEDA PERNULA, Müller.

*Arca pernula*, Müll. in Beschäft. Berl. Ges. naturf. Fr. iv. p. 57 (1779).

*L. pernula*, B. C. ii. p. 158; v. p. 173: G. O. Sars, Moll. reg. arct. Norv. t. v. f. 1 a-d.

'Porcupine' Exp. 1869: St. 4, Loch Torridon. 1870: Atl. 1, 2, 6, 9. One perfect specimen (but dead) and several valves of different sizes, all being more or less smooth or destitute of concentric striæ.

*Distribution.* Arctic Ocean in the N. Atlantic southwards to the Cattegat on the east and Maine on the west, Novaya Zembla, Behring Strait; 5-210 fms.

*Fossil.* Post-tertiary or "glacial." N. lat. 82°, N.E. America, Archangel, Scandinavia, Great Britain and Ireland; 0-1360 ft.

Being variable in shape and sculpture, this species has many synonyms.

## ✓ 2. LEDA MINUTA, Müller.

*Arca minuta*, Müll. Zool. Dan. Prodr. p. 247.

*L. minuta*, B. C. ii. p. 155, pl. iv. f. 2; v. p. 173, pl. xxix. f. 6.

'Porcupine' Exp. 1869: St. 1, 23a, 25, North Channel, the Minch, Little Minch, near Belfast. 1870: Atl. 2, 9 (valves only, and perhaps semifossil).

*Distribution.* Arctic seas in both hemispheres, to the Cattegat

<sup>1</sup> Brittle.

and Bay of Fundy in the N. Atlantic and to Japan in the N. Pacific ; 5-150 fms.

*Fossil.* Post-tertiary or "glacial." Scandinavia, Great Britain and Ireland, Labrador and Canada ; 0-130 ft.

The most common synonym is *L. caudata*, Donovan.

### 3. LEDA FRAGILIS, Chemnitz.

*Arca fragilis*, Chem. Conch.-Cab. vii. p. 199, t. 55. f. 546.

'Porcupine' Exp. 1870 : Atl. St. 10, Vigo B., 13, Setubal B., off C. Espichel, 22, 27-30, 36, Taugier B. ; Med. 45, Cartagena B., 50, 54, 55, Benzert Road, Rasel Amoush, Adventure Bank, off Rinaldo's Chair. Abundant in the Mediterranean cruize.

Some specimens are more closely striated than others.

*Distribution.* Atlantic coasts of France and Lusitania from Arcahon to C. Trafalgar, throughout the Mediterranean to the Ægean, Adriatic, G. of Florida ; 20-185 fms.

*Fossil.* Miocene and Pliocene. Belgium, N.W. Germany, Vienna Basin, Transylvania, Switzerland, S.W. & S. France, Italy, Greece, and Rhodes.

This species was unmistakably described and figured by Chemnitz ; and his specific name *fragilis* was adopted by that painstaking naturalist Dillwyn, and since by Hörnes and Hidalgo, although the last considered it distinct from the *Nucula commutata* of Philippi, which is certainly the present species. Risso, Chiareghini, and Eichwald gave it other names.

### 4. LEDA PELLA, Linné.

*Arca pella*, L. S. N. p. 1141.

*A. interrupta*, Poli, Test. utr. Sic. ii. t. 25. f. 4, 5.

'Porcupine' Exp. 1870 : Med. St. 50, 55, G. of Bona, Benzert Road, G. of Tunis, Adventure Bank. Varies in the sculpture, like *L. fragilis*.

*Distribution.* Atlantic coasts of Spain and Portugal, throughout the Mediterranean to the Sea of Marmora, Adriatic, Japan ; 4-100 fms.

*Fossil.* Miocene and Pliocene. Antwerp Crag, Poland, Vienna Basin, Switzerland, S.W. France, Italy, Greece, Rhodes and Cyprus.

The principal synonyms are *Arca interrupta* of Poli and *Nucula emarginata* of Payraudeau.

### 5. LEDA ARCTICA, Gray.

*Nucula arctica*, Gray in Suppl. App. Parry's first voyage, p. ccli (1824).

*Portlandia arctica*, G. O. Sars, Moll. reg. arct. Norv. p. 37, t. 4. f. 7a-h.

*L. arctica*, B. C. ii. p. 158.

'Porcupine' Exp. 1869 : St. Loch Torridon. A fine and perfect specimen and two valves, all apparently subfossil.

*Distribution.* Circumpolar in the N. Atlantic and Pacific, Novaya Zembla, Jenissei B., 'Valorous' Exp., Norwegian arctic Exp. 1878, Iceland, Finmark; 5-1333 fms.

*Fossil.* Post-tertiary or "glacial." Norway and Sweden, Scotland, N.E. America; 60 fms.-70 ft.

*Nucula glacialis*, Leach; *N. truncata*, Brown; *N. portlandica*, Hitchcock; *N. siliqua* and *N. sulcifera*, Reeve.

#### 6. LEDA MESSANENSIS, Seguenza.

*L. acuminata*, Jeffr. in Ann. & Mag. N. H. July 1870, p. 69: Seguenza, Nuculidi terziarie merid. d'Ital. (R. Acad. Linc. 1877, separate copy), p. 15, t. iii. f. 15, 15 a-e.

'Porcupine' Exp. 1869: St. 3, 15, 16, 23, 42. 1870: Atl. 1, 2, 3, 3a, 6, 9, Vigo B., 22, 24, off C. Sagres, 25-34, 36; Med. 55, Adventure Bank.

*Distribution.* 'Valorous' Exp., W. Norway, Mediterranean, 'Josephine' Exp. (Azores), 'Challenger' Exp. (between Azores and Bermuda); 100-1750 fms.

*Fossil.* Pliocene. S. Italy.

BODY clear white: *mantle* having its edges protruded and pouting; these are plain or slightly jagged, and not ciliated: *tubes* separate; the upper tube is cylindrical and long, and has two minute tubercles at the point, one above and the other below: *foot* extensile, and shaped like that of its congener.

The shell is variable in length, and is wholly or partly marked (especially in front) by close and regular concentric striæ.

After I had published the specific name *acuminata*, I found that it had been preoccupied for an Oolitic species, the *Nucula acuminata* of Von Buch, which is also a *Leda*. I have therefore substituted in the case of the present species Professor Seguenza's MS. name *messanensis*. Eichwald's *L. acuminata* is *L. fragilis*.

#### 7. LEDA PUSTULOSA, Jeffreys.

*L. pustulosa*, Jeffr. in Ann. & Mag. N. H. Nov. 1876, p. 430; Seg. Nuc. terz. p. 17, t. iii. f. 17, 17a-d.

'Porcupine' Exp. 1869: St. 16, 19, 20, 21, 23, 23a, 28, 30, 31, 58. 1870: Atl. 2, 3a, 17a, 27, 30.

*Distribution.* 'Valorous' Exp., 1450 fms.

*Fossil.* Pliocene. S. Italy.

#### 8. LEDA FRIGIDA, Torell.

*Yoldia frigida*, Tor. Spitzb. Moll. p. 148, t. i. f. 3.

'Porcupine' Exp. 1869: St. 9, 23a, 28, 31, 36. 1870: Atl. 1, 2, 3, 3a, 6, 9, 16, 22, 24, 26-34.

*Distribution.* Spitzbergen, 'Valorous' Exp., Novaya Zembla, Norwegian arctic Exp. 1877 and 1878, Loffoden Isles to Shetland, Palermo, G. of St. Lawrence, N. Japan; 3-650 fms.

*Fossil.* Pliocene and Post-tertiary. English last arctic Exp. (N. lat. 82° 33'), Norway, Reggio and Messina.

The teeth are much more numerous and finer than in *L. pustulosa*.

*Yoldia nana* of M. Sars.

9. LEDA TENUIS, Philippi.

*Nucula tenuis*, Phil. En. Moll. Sic. i. p. 65, t. v. f. 9.

*L. pygmæa*, B. C. ii. p. 154; v. p. 173, pl. xxix. f. 5.

'Lightning' Exp.: St. 2, 3, 5, 7.

'Porcupine' Exp., 1869: St. 1, 8, 13, 14, 15, 17, 18, 23a, 35, 61, 62, Loch Torridon. 1870: Atl. 1, 2, 3a, 9, 13, 22, 24, off C. Sagres, 26-34; Med. 45, Cartagena B., 55, Beuzert Road, Adventure Bank, off Rinaldo's Chair.

*Distribution*. Scandinavia to the Ægean; 10-650 fms.

*Fossil*. Pliocene and Post-tertiary. Siberia?, Scandinavia, Great Britain and Ireland, Belgium?, Transylvania?, Biot, Italy; 0-240 ft.

This species was referred by Philippi in his second volume to the *Nucula pygmæa* of Von Münster; but the description and figure of the latter species given by Goldfuss in his 'Petrefacta Germaniæ,' and specimens of the fossils kindly sent me by Dr. Wiechmann, have convinced me that they are different species. I have therefore adopted Philippi's original name *tenuis*. The well-known *Nucula tenuis* of Montagu belongs to another genus; but Philippi did not distinguish the genus *Leda*, and therefore changed his name for that of Von Münster. According to Forbes, *N. gibbosa* of James Smith is a variety of the present species. *L. tenuis* does not appear to inhabit the Arctic seas, although *L. lenticula* of Möller, = *Yoldia abyssicola*, Torell, has been mistaken for it by some authors, which makes it difficult to verify all the localities mentioned by them.

10. LEDA LENTICULA, Möller.

*Nucula lenticula*, Möll. Ind. Moll. Grœnl. p. 17.

*Yoldia abyssicola*, Torell, Spitz. Moll. t. i. f. 4, a, b.

'Porcupine' Exp. 1869: St. 9, 23a, Loch Torridon (perfect but dead and perhaps semifossil, like *L. arctica*). 1870: Atl. 34, 27, 28, 30. Valves only.

*Distribution*. Wellington Channel, Davis Strait, Dutch arctic Exp., Novaya Zembla, Norwegian arctic Exp. 1878, Shetland (semifossil?); 20-656 fms.

*Fossil*. Post-tertiary or "glacial." Norway, Clyde beds, Siberia, Labrador, Canada, Maine.

I agree with Professor G. O. Sars that this may be Möller's species; but the description is so short and indeterminate that it is almost equally applicable to *L. tenuis*. The late Professor M. Sars regarded it as a variety of the latter species, and as the *Nucula gibbosa* of James Smith. It is the *Yoldia abyssicola* of Torell, but not of M. Sars.

The present species is gibbous; and the anterior end is much more marked and upturned than in *L. tenuis*.

## ✓ 11. LEDA STRIOLATA, Brugnone.

*Yoldia striolata*, Brugn. Misc. Mal. (pars secunda, 1877), p. 9, f. 9.

*Y. abyssicola*, Seg. Nuc. terz. d'It. (1877), t. v. f. 28, 28a.

'Lightning' Exp.: St. 3.

'Porcupine' Exp. 1869: St. 39, 42, 47. 1870: Atl. 3a, 9, 16, 17, 17a, off C. Espichel, 22, 24, 31-34.

*Distribution*. Palermo; 114 fms.

*Fossil*. Pliocene. Calabria and Sicily.

Differs from the last species (*L. lenticula*) in being flatter, more sharply pointed or wedge-shaped at the anterior end, and concentrically striated; the striæ are regular and sometimes numerous, but usually distant and covering the front only. The epidermis in living specimens is yellowish-green. *Striolata* is not a classical word; and I had provisionally named this species *acutalis*, but of course give way to the previous publication. Monterosato gave it the MS. name of *producta*.

## ✓ 12. LEDA INTERMEDIA, M. Sars.

*Portlandia intermedia*, (M. Sars), G. O. Sars, Moll. reg. arct. Norv. p. 38, t. 4. f. 9, a-b.

'Porcupine' Exp. 1870: Atl. St. 16. A few valves, mostly imperfect.

*Distribution*. Greenland, Spitzbergen, 'Fox' Exp., Novaya Zembla, Norwegian arctic Exp. 1878, Dutch arctic Exp., Finmark; 25-1333 fms.

Not a North-Pacific species which I received from Mr. Dall as the *Yoldia intermedia* of Sars on the authority of the late Dr. Philip Carpenter.

## ✓ 13. LEDA LUCIDA, Lovén.

*Yoldia lucida*, Lov. Ind. Moll. Scand. p. 34.

*L. lucida*, B. C. ii. p. 155; v. p. 173, pl. c. f. 1.

'Lightning' Exp.: St. 1, 2, 3, 5.

'Porcupine' Exp. 1869: St. 9, 13, 14, 15, 16, 19, 22, 28, 62. 1870: Atl. 1, 2, 3, 3a, 9, 13, 16, 17, 17a (var. *declivis*; anterior end more sloping and not so much upturned nor pointed), 17b (var. *truncata*; anterior end abruptly cut off); Med. 55.

*Distribution*. Swedish arctic Exp. 1868, 'Valorous' Exp., Novaya Zembla, Norwegian arctic Exp. 1878, Finmark to Bohuslän, Palermo, G. St. Lawrence to Massachusetts B.; 10-730 fms.

*Fossil*. Post-tertiary or "glacial." Norway, and Clyde beds. According to his description and figure, Seguenza's *Yoldia lucida* is a variety of *L. pellucida*. The latter species differs from *L. lucida* in being wedge-shaped and terminating in a point on the anterior side; *L. lucida* is in that part more or less upturned and squarish.

The present species is *L. obesa* of Stimpson.

## 14. LEDA PUSIO, Philippi.

*Nucula pusio*, Ph. Moll. Sic. ii. p. 47. t. xv. f. 5.

*L. pusio*, var. *latior*, Jeffr. Ann. and Mag. N. H. Nov. 1876, p. 430.

'Porcupine' Exp. 1869: St. 16, 28; 1870, Atl. 3a, 16, 17a, off

C. Espichel, 22. This form appears to be the variety *salicensis* of Seguenza. Another variety, which I would call *semistriata*, is smoother, thinner, more glossy, and is partially striated either at the anterior end only or towards the front margin. It occurred in the 'Lightning' Expedition, Station 6, and in the 'Porcupine' Atlantic Expedition of 1870 at the following Stations, 2, 3, 6, 8, 9, 17, 24, 26-28a, 30-54. Young specimens of both varieties are nearly oval.

*Distribution.* 'Valorous' Exp. (var. *salicensis*), 'Josephine' Exp. (off the Azores; var. *semistriata*); 550-1750 fms.

*Fossil.* Pliocene. Vienna Basin, Italy from Leghorn to Messina. Var. *semistriata*, Messina.

#### B. Rounded at both ends.

✓ 15. LEDA SERICEA, Jeffreys. (Plate XLVI. fig. 1.)

*L. sericea*, Jeffr. in Ann. and Mag. N. H. Nov. 1876, p. 432.

'Porcupine' Exp. 1869: St. 19, 21, 30. 1870: Atl. 1 (var. *ovata*, longer in proportion to the breadth, but having the characteristic sculpture of the species), 16, 17, 17a.

*Distribution.* 'Valorous' Exp.; 1450 fms.

✓ 16. LEDA JEFFREYSI, Hidalgo. (Plate XLVI. fig. 2.)

*L. lata*, Jeffr. in Ann. and Mag. N. H. Nov. 1876, p. 431.

'Porcupine' Exp. 1869: St. 9, 20, 30, 31. 1870: Atl. 16, 17, 17a.

*Distribution.* 'Valorous' Exp., 'Challenger' Exp. (between the Azores and Bermuda); 690-1785 fms.

Dr. Hidalgo, in his work above mentioned, has pointed out that the specific name *lata* (which I gave this shell) had been preoccupied by Mr. Hinds in the 'Zoology of the Voyage of H.M.S. Sulphur' (1845) for a New-Guinea species, and that, although named there *Nucula lata*, it belonged to the genus *Leda*. He accordingly proposed to cancel the name *lata* and call the present species by my own name, a compliment for which I am grateful.

✓ 17. LEDA SUBÆQUILATERA<sup>1</sup>, Jeffreys. (Plate XLVI. fig. 3.)

SHELL transversely oblong-oval, nearly equilateral, somewhat depressed, rather thin, glossy, semitransparent: *sculpture* none except a few irregular periodical lines of growth: *colour* whitish: *epidermis* yellowish-white: *margins* obtuse-angled and pinched up at the back, equally rounded at each end, slightly produced or extended on the anterior side, gently curved in front: *beaks* almost central, prominent, rather gibbous, and incurved: *lunule* wanting, in consequence of the pouting and sharp margin at the back: *cartilage* and pit very minute, the latter sunken: *hinge-line* obtuse-angled: *hinge-plate* rather narrow, but strong: *teeth* small, erect and comb-like, 8 on each side, besides 4 or 5 minute tubercles near the beak:

<sup>1</sup> Nearly equilateral.

*inside* smooth and polished; edge sharp and plain: *scars* indistinct. L. 0·225, B. 0·35.

‘Lightning’ Exp.: St. 3.

‘Porcupine’ Exp. 1869: St. 23, 23*a*, 65. 1870: Atl. 3, 9, 17, 17*a*.

*Distribution.* Norwegian arctic Exp. 1878; 459–778 fms.

Differs from *L. jeffreysi* in its somewhat greater size, being at all ages much broader in proportion to the length (and consequently more extended on each side), the anterior end not being upturned, and in the hinder margin being sharp-edged and pinched up.

18. LEDA MICROMETRICA, Seguenza.

*L. micrometrica*, Seg. Nuc. terz. mer. d’It. p. 21, t. iv. f. 22, 22*a*–*c*.

‘Porcupine’ Exp. 1869: St. 23*a*. 1870, Med. 55. Valves only.

*Distribution.* Sciacca, Sicily.

*Fossil.* Pliocene. Trapani near Messina.

I had previously given to this minute but distinct species the name *oblonga*, by which Monterosato called it.

19. LEDA EXPANSA, Jeffreys. (Plate XLVI. fig. 4.)

*L. expansa*, Jeffr. in Ann. and Mag. N. H. Nov. 1876, p. 431.

‘Porcupine’ Exp. 1869: St. 16, 30.

*Distribution.* ‘Valorous’ Exp.; 690–1750 fms.

20. LEDA INSCULPTA<sup>1</sup>, Jeffreys. (Plate XLVI. fig. 5.)

SHELL transversely oval, equilateral, rather convex, moderately solid, semitransparent, and glossy: *sculpture*, numerous and regular but minute and fine concentric impressed striæ, which become stronger towards the front and are wanting at the back: *colour* white: *epidermis* pale yellowish: *margins* sinuous at the back owing to the prominence of the beaks, equally rounded on both sides, and curved in front: *beaks* central, prominent: *cartilage* and pit minute, the latter sunken: *hinge-line* forming a very obtuse angle: *hinge-plate* rather broad: *teeth* small, sharp and comb-like, deflected outwards, 8–10 on each side of the beak; they are placed on the inner side of the hinge-plate: *inside* lustrous, microscopically fretted, plain-edged: *pallial and muscular scars* rather distinct, the former being broad. L. 0·075. B. 0·115.

‘Porcupine’ Exp. 1869: St. 16. 1870: Atl. 16, 17, 17*a*.

Differs from *L. expansa* in shape, convexity, and sculpture.

21. LEDA PUSILLA<sup>2</sup>, Jeffreys. (Plate XLVI. fig. 6.)

SHELL roundish-oval, equilateral, somewhat compressed, remarkably solid for its size, opaque and glossy: *sculpture*, numerous and close-set concentric and very fine microscopic striæ, which cover the whole shell: *colour* whitish: *margins* rounded on every side, except at the back so far as the continuity is interrupted by the beaks, con-

<sup>1</sup> Engraved.

<sup>2</sup> Tiny.

tracted in front: *beaks* central, but not prominent: *cartilage* and pit very small, somewhat elongated transversely: *hinge-plate* rather broad and strong: *teeth* minute and short, tubercular, 6-8 on each side: *inside* polished, plain-edged: *scars* indistinct. L. 0·0275. B. 0·0375.

'Porcupine' Exp. 1870: Atl. St. 2, 3, 3a, 8, 9, Vigo B., 17a, 24. *Distribution*. Palermo and Sciacca; 113½ fms.

Originally named by me *microscopica*; but that word is too much like *micrometrica*, which has been since used by Seguenza for another species above mentioned.

✓ 22. LEDA MINIMA, Seguenza.

*Yoldia minima*, Seg. Nuc. terz. merid. d'It. p. 18, t. v. f. 27, 27a-c.

'Porcupine' Exp. 1870: Atl. St. 3, 13, 17, 17a, 24; Med. 55. *Fossil*. Pliocene. Province of Messina.

The specific name is inappropriate, because this species is not the smallest of the genus *Leda*. I had provisionally named it *subrotunda*; and Monterosato published that name, treating Seguenza's as a synonym.

A. Edge plain or smooth.

✓ 1. NUCULA TENUIS, Montagu.

*Arca tenuis*, Mont. Test. Brit. Suppl. p. 56, t. xxix. f. 1.

*N. tenuis* B. C. ii. p. 151; v. p. 172, pl. xxix. f. 4.

'Lightning' Exp.: St. 3, 5, 7.

'Porcupine' Exp. 1869: St. 1, 6, 9, Galway B., 13, 17. 1870: Atl. 1, 2, 3, 9, Vigo B., 13, 16, 24, off C. Sagres.

*Distribution*. Circumpolar in the North Atlantic and Pacific, 'Valorous' Exp., Iceland to the N.W. coast of France, Mediterranean (*Nares*)!, Maine northwards, Kamptchatka Sea, Vancouver I., N. Japan; 3-365 fms.

*Fossil*. Pliocene and Post-tertiary. Scandinavia, Great Britain and Ireland, Calabria and Messina, Canada and Maine; 0-12 ft.

The arctic form is *N. inflata* of Hancock, *N. antiqua*, Mighels, *N. expansa*, Reeve, and perhaps *N. bellotii* of A. Adams. In a fossil state the typical form is *N. decipiens* of Philippi.

✓ 2. NUCULA ÆGEENSIS, Forbes.

*N. ægeensis*, Forb. Rep. Brit. Assoc. 1843, p. 192: Hanley, Nuculidæ, p. 56, pl. v. f. 154.

'Porcupine' Exp. 1870: Atl. St. 17a, 26-34, 36; Med. off Jijeli, 51, 55, Benzert Road, Adventure Bank, off Rinaldo's Chair, 58.

*Distribution*. Mediterranean eastward to the Ægean, Adriatic; 60-250 fms.

*Fossil*. Pliocene. Ficarazzi near Palermo.

Assuming this to be Forbes's species (although his description is too scanty to be satisfactory), it may be distinguished from *N. tenuis*

by its usually smaller size, thinner texture, having a rounder and less oblique outline, and being more uniformly convex; the posterior side is more abruptly angular; the beaks are more gibbous, and straight instead of inclining to one side; the hinge-line is broader, and teeth fewer; and the cartilage and pit are shorter and smaller, and not placed so obliquely as in *N. tenuis*.

*N. macandræi* of Hanley. The young was named by me *N. convexa*; and the fry appears to be the *N. perminima* of Monterosato.

### 3. NUCULA CORBULOIDES, Seguenza.

*N. corbuloides*, Seg. Nuc. terz. merid. d'It. p. 9, t. i. f. 3, 3a-h.

'Porcupine' Exp. 1869: St. 5, 6, 23, 40, 41. 1870: Atl. 3, 16, 17, 17a.

*Fossil*. Pliocene. Calabria and Messina district.

This somewhat resembles the young of *N. ægeensis*, but is more triangular and gibbous, besides being closely and regularly striated in the line of growth. I had provisionally named it *N. gibba*.

### 4. NUCULA DELPHINODONTA, Mighels.

*N. delphinodonta*, Migh. and Adams, in Proc. Boston Soc. Nat. Hist. i. p. 48 (1841); ii. p. 324, pl. iv. f. 5 (1842).

'Lightning' Exp.: St. 3.

'Porcupine' Exp. 1869: St. 65.

*Distribution*. Davis Strait, 'Valorous' Exp., Norwegian arctic Exp. 1878, Norway from Vadsoe to Christianiafiord, N.E. America from G. St. Lawrence to B. of Fundy; 25-410 fms.

*Fossil*. Pliocene. Sicily.

*N. corticata* of Möller. The fry are oval.

### B. Edge crenated.

### 5. NUCULA TUMIDULA, Malm.

*N. tumidula*, Malm in Scand. Naturf. Förh. viii. (1860), p. 621: Göt. K. Vet. Vitt. Samh. Handl. Ny tidsf. viii. (1863), p. 122, pl. 2. f. 3.

'Porcupine' Exp. 1869: St. 36, 39, 47. 1870: Atl. 3a, 6, 9, Vigo B., 16, 17, 22,; Med. 55. A valve from the last station, at the depth of 1456 fathoms, is permeated by the same peculiar organism which I noticed in my papers on Mollusca from the 'Valorous' Expedition. What is it?

*Distribution*. From Finmark to Bohuslän, Palermo, 'Challenger' Exp. (off Pernambuco); 20-650 fms.

*Fossil*. Pliocene. Calabria and Sicily.

It is the *N. pumila* of Lovén MS., according to Asbjørnsen=*N. nucleus*  $\beta$  in Ind. Moll. Scand. Not my var. *tumidula* of *N. nucleus*, erroneously referred by me to the present species, which I then knew only by a short description, not having seen Malm's figure or a specimen. The young in a fossil state has been lately described and

figured by Seguenza as *N. umbonata*. This species differs from *N. proxima*, Say, in shape and sculpture, and is much smaller and less solid.

✓ 6. *NUCULA RETICULATA*, Jeffreys. (Plate XLVI. fig. 7.)

*N. reticulata*, Jeffr. in Ann. and Mag. N. H. Nov. 1876, p. 429.

'Porcupine' Exp. 1869: St. 16, 19, 20, 21, 23a, 28, 30.

*Distribution*. 'Valorous' Exp., 'Challenger' Exp. (off San Miguel, Azores); 1000–1100 fms.

*N. reticulata* of Hanley (from the Philippines) is a species of *Leda*.

✓ 7. *NUCULA STRIATISSIMA*, Seguenza.

*N. striatissima*, Seg. Nuc. terz. merid. d'It. p. 6, t. i. f. 1a-c.

'Porcupine' Exp. 1870: Atl. St. 17. A single but perfect specimen.

*Fossil*. Pliocene. Messina district.

This is more closely and finely striated than any other known species of *Nucula*. The *N. trigona* of Seguenza seems to be a variety, judging from the examination of a specimen which he kindly sent me for that purpose. I do not like the barbarous name *striatissima*; but it is more characteristic than *trigona*, because all the species of the present genus are more or less triangular. Seguenza describes *N. trigona* as smooth (*levis*); but his figure and specimen show that it is closely striated lengthwise.

✓ 8. *NUCULA SULCATA*, Bronn.

*N. sulcata*, Bronn, Italiens Tertiär-Gebilde, p. 109 (1831): B. C. ii. p. 141; v. p. 172, pl. xxix. f. 1, 1a.

'Porcupine' Exp. 1869: St. 1, 6, 9, Galway B., 13, 17, 18, the Minch, Little Minch, Loch Torridon. 1870: Atl. 3a, 9, 10, 13, Setubal B., 22, 25, off C. Sagres, 26–30, 36; Med. 45, Capo de Gata, Cartagena B., 50, off Jijeli, Benzert Road, Rasel Amoush, Adventure Bank, off Rinaldo's Chair. The sculpture varies considerably in its comparative coarseness or fineness.

*Distribution*. Norway to the Ægean and Sea of Marmora, and the Adriatic; 5–190 fms.

*Fossil*. Miocene, Pliocene, and Post-tertiary. Bohuslän, Caithness, N.W. Germany, Biot, Italy, and Rhodes.

*N. polii*, Philippi, and other obsolete synonyms. Not *N. sulcata*, A. Adams, from New Zealand.

✓ 9. *NUCULA NUCLEUS*, Linné.

*Arca nucleus*, L. S. N. p. 1143.

*N. nucleus*, B. C. ii. p. 143, pl. iv. f. 1; v. p. 172, pl. xxix. f. 2.

'Lightning' Exp.: St. 4.

'Porcupine' Exp. 1869: St. 1, 2, 6, 9, 14, 18, near Belfast. 1870: Med. Capo de Gata, Rasel Amoush.

*Distribution*. Norway to Mogador, and through the Mediterranean eastward to the coast of Egypt, and the Adriatic; 2–145 fms.

*Fossil.* Miocene, Pliocene, and Post-tertiary. Everywhere throughout Europe, Asia Minor, and Algeria; 0-350 ft.

*Glycymeris argentea* of Da Costa, *Arca margaritacea* of Bruguière, and other useless synonyms.

✓ 10. *NUCULA NITIDA*, G. B. Sowerby.

*N. nitida*, Sow. Conch. Ill. (*Nucula*) p. 5, f. 20: B. C. ii. p. 149; v. p. 172, pl. xxix. f. 3, 3a.

'Porcupine' Exp. 1869: St. 2, 9, 18, 19. 1870: Atl. 3, Vigo B.; Med. 50, 50a (var. *veytrosa*; swollen and smooth), 51, 55, G. Bona, Benzert Road, Tunis B., Adventure Bank.

*Distribution.* Scandinavia to Smyrna; 0-120 fms.

*Fossil.* Pliocene and Post-tertiary. Coralline Crag, Paisley, Italy.

Not *N. nitida* of Bronn, which is *Arca (Leda) nitida* of Brocchi. A streaked variety of the present species is analogous to the variety *radiata* of *N. nucleus*.

✓ 1. *PECTUNCULUS GLYCYMERIS*, Linné.

*Arca glycymeris*, L. S. N. p. 1143.

*P. glycymeris*, B. C. ii. p. 166, pl. iv. f. 4; v. p. 175, pl. xxx. f. 2.

'Lightning' Exp.: St. 5.

'Porcupine' Exp. 1869: St. the Minch. 1870: Atl. Vigo B., Setubal B., 26, 36, Tangier B.; Med. Adventure Bank.

*Distribution.* Finmark and the Faroe Islands to Mogador, throughout the Mediterranean to Jaffa, Adriatic, Senegal, Madeira, Canaries, N. Japan; 0-120 fms.

*Fossil.* Pliocene and Post-tertiary. Great Britain and Ireland, Belgium, S. France, Italy, Rhodes.

It is difficult to verify the recorded localities for this species and *P. pilosus*, which have been evidently confounded by many authors.

*P. pilosus* is a larger, thicker, and more orbicular or globose shell; the longitudinal striæ are more conspicuous and distinct; the hinge-area is wider, and the teeth are fewer and larger. The synonyms of each are numerous, but have been intermixed.

✓ 2. *PECTUNCULUS NUMMARIUS*, Linné.

*Arca nummaria*, L. S. N. p. 1143.

*A. insubrica*, Brocchi, Conch. foss. subapp. ii. p. 492, t. xi. f. 10.

'Porcupine' Exp. 1870: Med. St. Algesiras B., 50, Adventure Bank.

*Distribution.* S.W. France, Mediterranean eastwards to the coast of Egypt, Adriatic, Madeira and Canaries; 6-120 fms.

*Fossil.* Pliocene. Coralline Crag, S. France, Italy, Morea, Rhodes, and Cyprus.

Although Linné's description was taken from a young specimen, there can be no doubt as to the species, and his name ought to be retained. It is the *P. violacescens* of Lamarck, and has many other synonyms. Poli's figure (1 in plate xxvi.), without name or reference

excellently represents this species; and so does Payraudeau's figure (pl. ii. f. 1) of *P. violaccscens*.

A. Inside edge plain or smooth.

✓ 1. LIMOPSIS AURITA, Brocchi.

*Arca aurita*, Broc. Conch. foss. subapp. ii. p. 485, t. xi. f. 9.

*L. aurita*, B. C. ii. p. 161, pl. iv. f. 3; v. p. 174, pl. xxx. f. 1.

'Lightning' Exp.: St. 2, 5, 7.

'Porcupine' Exp. 1869: St. 3, 13, 14, 23a, 25, 45, 65. 1870: Atl. 1, 2, 3, 3a, 6, 8, 9, Vigo B., 13, 24, C. Sagres, 26-30, 36, Tangier B.; Med. Adventure Bank.

*Distribution*. Shetland, off W. coast of Ireland, 'Josephine' Exp. (Josephine Bank, off Gibraltar), Palermo, 'Valorous' Exp., Wellington Channel, 'Challenger' Exp. (off the Azores, Bermuda, and Colabra I.), Japan; 21-1100 fms.

*Fossil*. Miocene and Pliocene. Denmark, Coralline and Red Crag, Holland, Antwerp, N.W. Germany, S. France, throughout Italy, and near Melbourne.

*L. obliqua* and *L. cumingii* of A. Adams. Some of his other species require further examination. The shell of *L. aurita* becomes oblique in the course of growth. In a fossil state it is the *L. (Trigonocælia) lavigata* of Nyst.

B. Inside edge crenated.

✓ 2. LIMOPSIS CRISTATA, Jeffreys. (Plate XLVI. fig. 8.)

*L. cristata*, Jeffr. in Ann. & Mag. N. H. Nov. 1876, p. 434.

'Lightning' Exp. St. 5.

'Porcupine' Exp. 1869: St. 2, 23, 23a, 36, 40, 47. 1870: Atl. 2, 9, 17, off C. Espichel, 22, 24.

*Distribution*. 'Valorous' Exp.; 690 fms.

A young specimen of *L. minuta* is figured (Pl. XLVI. f. 9) for comparison with *L. cristata*.

✓ 3. LIMOPSIS MINUTA, Philippi. (Plate XLVI. fig. 9.)

*Pectunculus minutus*, Ph. En. Moll. Sic. i. p. 63, t. v. f. 3, 3a, b; ii. p. 45.

*L. borealis*, B. C. ii. p. 164; v. p. 174, pl. c. f. 3.

'Porcupine' Exp. 1869: St. 2, 3, 15, 23, 23a, 36, 45, 65. 1870: Atl. 1, 2, 3, 3a, 6, 9, Vigo B., 13, 17a, 24-34. Var. *angusta*, St. 25. Smaller, narrower, thinner, and more oblique, slantingly truncated or contracted at the upper part of the posterior side, hinge-line shorter, and having a pinkish-brown stain at the beaks and inside near the back. Some specimens of the typical form are finely and closely reticulated; and in others the concentric ridges are crenated. See Ann. and Mag. (*supra cit.*) for further particulars as to this species.

*Distribution*. Throughout the North Atlantic in deep water from Finmark to Sicily, C. Good Hope, 'Josephine' Exp. (Azores), Nor-

wegian arctic Exp. 1878, 'Challenger' Exp. (off Fayal); 70-790 fms. Var. *angusta*, 'Challenger' Exp. (off Teneriffe); 70 fms.

*Fossil.* Miocene and Pliocene. Cassel, Mayence Basin, Italy.

Recent: *L. borealis*, Woodward, *L. abyssicola*, A. Adams, and the very young *L. tenuis*, Seguenza. *Fossil*: *Pectunculus aradasii*, Testa, *P. grossi*, Aradas, and *L. inæquidens*, Sandberger.

### 1. MALLETTIA OBTUSA, M. Sars.

*Yoldia abyssicola*, M. Sars in Christ. Vid. Selsk. Förh. (1858), p. 86.

*Y. obtusa* (M. Sars), G. O. Sars 'On some remarkable Forms of animal Life from the great Deeps off the Norwegian Coast' (1872), p. 23, pl. 3. f. 16-20.

'Porcupine' Exp. 1869: St. 19, 22, 28, 30. 1870: Atl. 9, off C. Espichel. The body is clear-white and gelatinous, and the upper tube is very long and cylindrical.

*Distribution.* Loffoden Isles to the Bergen coast, Norwegian arctic Exp. 1876 (between Norway and Iceland); 200-650 fms.

The MS. name *abyssicola*, originally given by the late eminent Professor Sars to this remarkable shell, was afterwards changed by him to *obtusa* in consequence of Torell having described and figured another shell which Sars regarded as also belonging to *Yoldia*, under the same name *abyssicola*. The present species is not the *Yoldia obtusa* of Gould (1846), from Hong-Kong harbour; but that shell belongs to the genus *Leda*; and at all events it is better to avoid further confusion by appropriating the name *obtusa* to the North-Atlantic shell. For the reasons which I gave in 'British Conchology' (ii. 153), I cannot recognize the genus *Yoldia*.

The late Dr. Mörch placed this species in the genus *Mallettia* of Desmoulins, from an examination of my specimens. A tribute of respect to his memory is justly due from all conchologists for his bibliographical research, and other valuable labours.

### 2. MALLETTIA CUNEATA, Jeffreys. (Plate XLVI. fig. 10.)

*M. cuneata*, Jeffr. in Ann. & Mag. N. H. Nov. 1876, p. 435.

'Porcupine' Exp. 1869: St. 19, 20, 28. 1870: Atl. 16, 17, 17a, off C. Espichel, 22; Med. 51.

*Distribution.* 'Valorous' Exp., Norwegian arctic Exp. 1876; 1333-1760 fms.

### 3. MALLETTIA EXCISA, Philippi.

*Nucula excisa*, Ph. Moll. Sic. ii. p. 46, t. xv. f. 4.

*M. excisa*, Jeffr. in Ann. & Mag. N. H. Nov. 1876, p. 435.

'Porcupine' Exp. 1869: St. 20, 21, 28.

*Distribution.* 'Valorous' Exp., 'Challenger' Exp. (W. of Azores and Canaries); 1125-1785 fms.

*Fossil.* Pliocene. Biot, Calabria, and Sicily.

It will be seen that the last species, as well as many other deep-water shells which have been noticed in the present paper, are Calabrian and Sicilian Tertiary fossils. Besides these species, others of the

same kind, and which had been also considered extinct (viz. *Leda* or *Tindaria solida*, Seg., *Nucula glabra*, Ph., and *Malletia dilatata*, Ph.), occurred in the 'Challenger' Expedition. The communication between the North Atlantic and the Mediterranean must have been formerly very different from what it is now, when a barrier or ridge in comparatively shallow water exists outside the Strait of Gibraltar, between Capes Spartel and Trafalgar. It is improbable that deep-sea Mollusca, even in their embryonic state, could have migrated or been transported under such conditions from one sea to another. The south of France and Italy must have experienced a great elevation, and perhaps a succession of them, since the Pliocene period. For instance, the average depth at which *Malletia excisa* has been now found living is  $1507\frac{1}{3}$  fathoms, or 9044 feet, being very nearly five-sixths of the height of Mount Etna above the present level of the sea; and to this submarine elevation must be added the height of the Pliocene beds above the sea-level. Professor Seguenza informs me that *M. excisa* occurs in Sicily, as well as in Calabria, at a height of 600 metres or nearly 2000 feet, and that these fossiliferous beds attain double that height in other parts of the same district; so that the total elevation may be estimated at from 11,000 to 12,000 feet. Mount Etna is 10,874 feet high.

I have to acknowledge my obligations to the Rev. R. Boog Watson for his kind assistance in examining and comparing some of the 'Challenger' shells above referred to.

SUMMARY OF THE FOREGOING MOLLUSCA.

Families.	Genera.	No. of species.
I. ANOMIIDÆ .....	ANOMIA .....	2
II. OSTREIDÆ.....	OSTREA .....	2
III. SPONDYLIDÆ .....	SPONDYLUS.....	1
IV. PECTINIDÆ .....	PECTEN .....	18
	AMUSSIUM .....	3
	LIMA .....	7
V. AVICULIDÆ.....	AVICULA.....	1
	PINNA .....	1
VI. MYTILIDÆ .....	MYTILUS .....	7
	MODIOLARIA ....	4
	CRENELLA .....	1
	DACRYDIUM ....	1
	IDAS.....	1
VII. ARCIDÆ .....	ARCA .....	10
	GLOMUS .....	1
	SILICULA .....	1
	LEDA .....	22
	NUCULA .....	10
	PECTUNCULUS ....	2
	LIMOPSIS .....	3
	MALLETIA .....	3
	Total.....	101

I take this opportunity to make a few additions and corrections to Part I. of this series of papers (Brachiopoda), P. Z. S. 1878 :—

Page 401. *Terebratula caput-serpentis*, var. *septentrionalis*. Norwegian arctic Exp. 1877, Dutch arctic Exp. 1878 ; 210–300 fathoms !

P. 402. *Terebratula trigona* of Quensted is a species of *Rhynchonella*.

P. 408. Prof. G. O. Sars agrees with me that *Terebratula septata* and *T. septigera* are one and the same species.

P. 410. *Argiope cuneata*, G. Gascony (De Folin) !

P. 411. *Platydia anomioïdes*, G. Gascony (De Folin, as *P. davidsoni*) !

P. 412. *Thecidea mediterranea*, G. Gascony (De Folin) !

P. 415. *Discina atlantica*. ‘Challenger’ Exp., off the coast of N. Australia (Watson).

#### EXPLANATION OF THE PLATES.

##### PLATE XLV.

- Fig. 1. *Peeten fragilis*, p. 561.  
 2. *Lima subovata*, p. 563.  
 3. *Idas argenteus*, p. 570.  
 4. *Area friclei*, p. 573.  
 5. *Glomus nitens*, p. 573.  
 6. *Silicula fragilis*, p. 574.

##### PLATE XLVI.

- Fig. 1. *Leda sericea*, p. 579.  
 2. — *jeffreysi*, p. 579.  
 3. — *subæquilatera*, p. 579.  
 4. — *expansa*, p. 580.  
 5. — *insculpta*, p. 580.  
 6. — *pusilla*, p. 580.  
 7. *Nucula reticulata*, p. 583.  
 8. *Limopsis cristata*, p. 585.  
 9. — *minuta* (for comparison), p. 585.  
 10. *Malletia cuneata*, p. 586.

2. On the Birds collected in Bolivia by Mr. C. Buckley.  
 By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT  
 SALVIN, M.A., F.R.S.

[Received June 17, 1879.]

The materials of our present communication are the collections made in Bolivia by Mr. Clarence Buckley, a well-known and enthusiastic collector of Lepidopterous insects. On his first expedition to this republic (in 1873–4), Mr. Buckley went principally in quest of Butterflies, and of Birds obtained only a certain number of Trochilidæ for Mr. Gould.

Before starting again for Bolivia in 1875, Mr. Buckley arranged with Messrs. Salvin and Godman to form a general series of birds for their joint collection.